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PCWorld

MAY 2023



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A PRACTICAL GUIDE

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Gordon Moore, Intel co-founder and chip industry legend, dies at 94

Moore was known for his philanthropy as well as his namesake axiom. **BY MARK HACHMAN**

Gordon Moore, the co-founder of Intel and a titan of the semiconductor industry whose “Moore’s Law” literally served as the measuring stick for the entire chip business, died Friday at his home in Hawaii. He was 94.

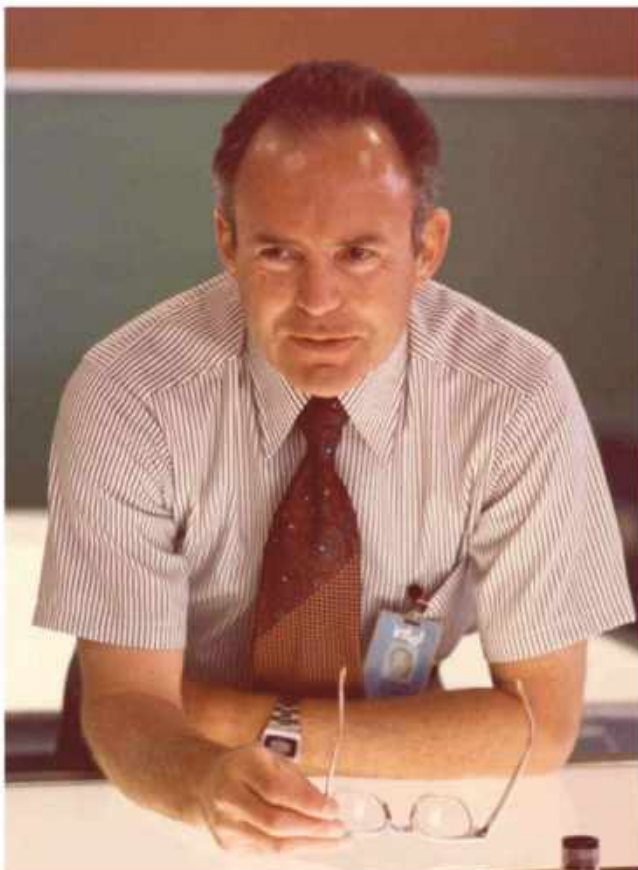
Intel confirmed the news Friday afternoon, along with the Gordon and Betty Moore Foundation, which Moore and his wife founded in 2000. In 2017, *The Chronicle of*

Philanthropy marked the two as California’s most generous donors, giving a total of \$6.3 billion to “create positive outcomes for future generations.”

Moore co-founded Fairchild Semiconductor in 1957, then left to co-found Intel with Robert Noyce. (Andy Grove is largely credited as being the third of the trio that was responsible for Intel’s success, but he joined on the day Intel was first incorporated.) Moore served as executive vice president

until 1975, then became president and later chief executive in 1979. He gave up the CEO position in 1987 to Grove, but he remained chair through 1997.

It was Moore's Law, though, that survived Moore's entire tenure. Not a law but an axiom, Moore originally postulated that transistor density would double every year, a "law" that varied between 12 to 18 months or so for the remainder of his life. The regularity of such advancements was so fixed that Intel itself began measuring its own processor advancements on a "tick-tock" model: shrinking the chip one year, redesigning it the next. Corollaries to Moore's Law also



Moore co-founded Intel back in 1968.

governed the number of transistors found on a chip, suggesting that a chipmaker moving to a new generation could reduce the power of the chip while keeping the speed the same or use a similar amount of power but increase its speed.

Moore only came up with the concept when asked by *Electronics Magazine* to essentially predict the future.

Moore, a modest man, wasn't fond of the term, either. "For the first 20 years I couldn't utter the term 'Moore's Law,'" Moore said in 2015 (fave.co/3A2BZ2B). "It was embarrassing. I finally got accustomed to it enough that I can say it with a straight face."

The end of Moore's Law has been bandied about for years and hasn't quite happened, though some would say that it has continued to slow. Current CEO Pat Gelsinger has reiterated that Moore's Law is not dead, a claim Nvidia CEO Jensen Huang made to PCWorld's Gordon Mah Ung in 2022 (fave.co/3UvWzSF).

Moore was known as much for his philanthropy as for his contributions to science, and the Gordon and Betty Moore Foundation continues to work on initiatives to fund science, environmental conservation, patient care, and Bay Area science museums. Moore received the Presidential Medal of Freedom, the nation's highest civilian honor, from President George W. Bush in 2002.

Moore is survived by his wife, Betty, two sons, and four grandchildren. 



ChatGPT vs. Bing vs. Bard: Which AI is best?

These are the top AI chatbots, but which one is the best overall? **BY MARK HACHMAN**

ChatGPT, Bing Chat, and Bard promise to transform your life using the power of artificial intelligence, through AI conversations that—just like those with a human being—can inform, amuse, and educate you. But how *good* are these new AI chatbots, really? We tested them to find out.

We asked all three AIs a variety of different

questions: some that expanded upon general search topics, some that demanded an opinion, logic puzzles, even code—and then asked them to be more creative, such as by writing an alternate, better ending to *Game of Thrones* and a *Seinfeld* scene with a special guest. We've included all of their answers, or as much of them as we could provide, and we'll let you decide for yourself.

One note: We have access to all three AI chatbots—the free Bing Chat (fave.co/3jqPwp0), the free Google Bard (fave.co/3zSZ1cq), and the paid version of ChatGPT+ (which costs \$20 for the month, fave.co/414KKVZ). We opted for the paid version of ChatGPT (fave.co/3wnuJwM), since it includes access to the new GPT-4 language model. However, that version is extremely limited right now—just 25 to 40 queries are permitted every few hours, after which it defaults to the somewhat less-sophisticated GPT-3 language model, which happened to us toward the end of our test queries.

Here are the questions we asked all three AI chatbots (Bing, then ChatGPT, then Bard), their responses, and any notes we made about the conversation. We've tried to add the entirety of the response when possible. (We've also chosen

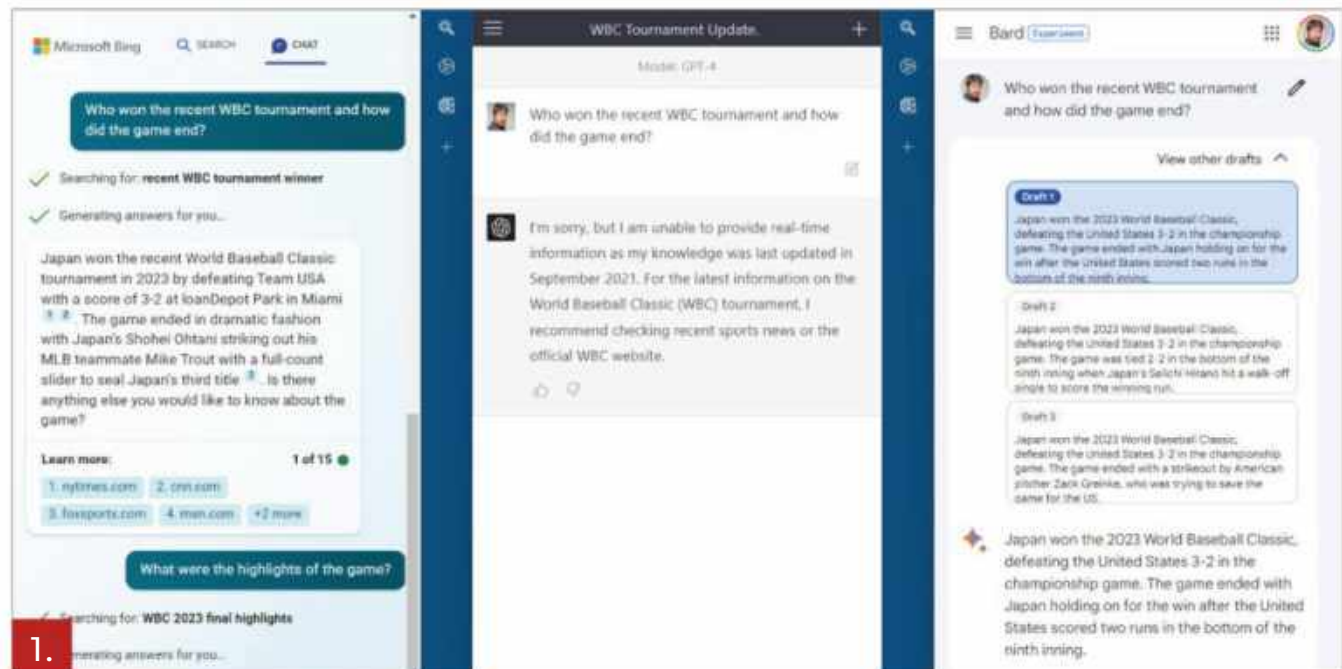
to stick with the “first draft” of Bard results; it can offer alternate explanations, but we're not sure how many users will seek them out.)

And yes, we have a winner for best AI chatbot! We tally up the votes at the end.

1. UP-TO-DATE INFORMATION: WORLD BASEBALL CLASSIC FINAL RESULT

Winner: Bing

Though we know that ChatGPT will add web-browsing capabilities (fave.co/41oryID) that will keep it up to date, right now its “current” information ends in 2021. We still wanted to know whether Bing or Bard would be able to pass along recent information. Only Bing succeeded. Bard simply hallucinates the outcome—and not just once, but across all of its drafts.

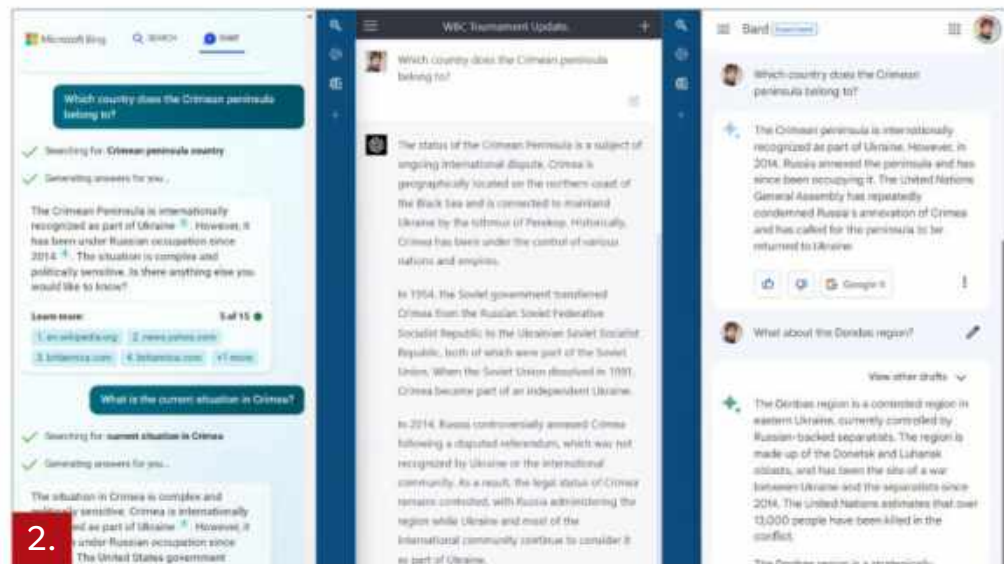


Bing wins this hands-down. It's hard to believe Bard screws this up so badly.

2. CURRENT EVENTS: CRIMEA

Winner: Tie

We asked all three AI chatbots to tell us which country the Crimean peninsula belongs to. Points to Bing and Bard for answering the question directly. ChatGPT provides additional context, but provides what it considers to be the (correct) answer in the last sentence. All three of the AI chatbots correctly pointed out the complicated nuances of a similar question on whether Taiwan is an independent country.

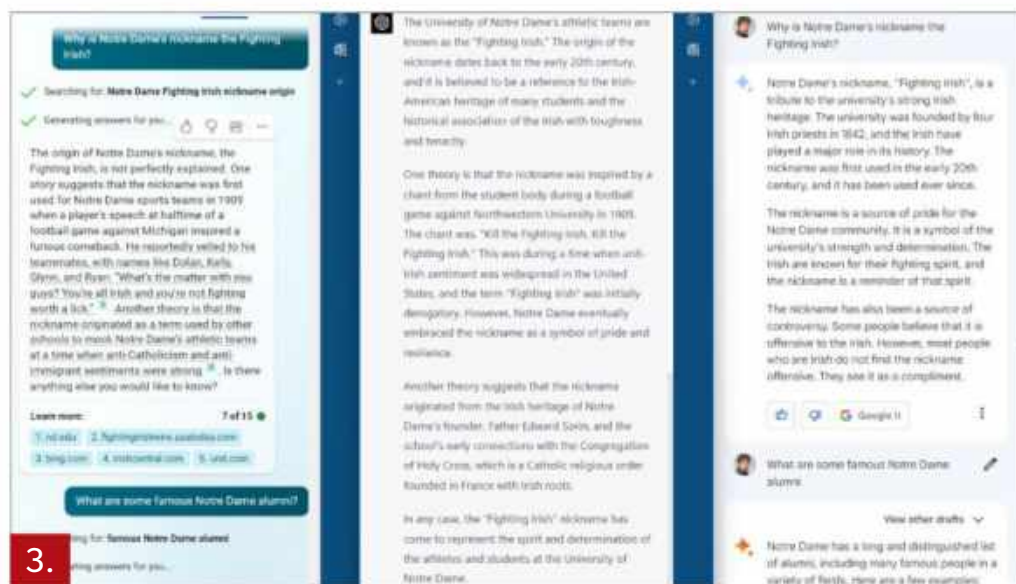


We'd say all three AI engines do a good job here.

3. UNCERTAIN INFORMATION: NOTRE DAME FIGHTING IRISH

Winner: Bing

The origin of the University of Notre Dame's nickname, the Fighting Irish, is apocryphal:



All three chatbots do a nice job summarizing the information, but there's a lot more that the snippets don't mention.

It's attributed to a variety of sources, none of them definitive. The university's own explanation, which Bing links to, lists a number of possibilities. It's worth checking out additional sources for further information on this topic, and

Bing does the best job here of forwarding you to those.

4. COMPLEX SEARCHES: GAMING PCS THAT CAN PLAY OVERWATCH 2 AT SPECIFIC SETTINGS

Winner: Bard

The great depth and variety of gaming blogs and YouTube channels implies that virtually every gaming question you might have has been addressed *somewhere*, but this is pretty much exactly the scenario you'll eventually use AI for: deep contextual information. Bing searched out a YouTube video ([fave.co/41os96R](https://www.youtube.com/watch?v=41os96R)) for one of its

answers and didn't do badly on pricing.

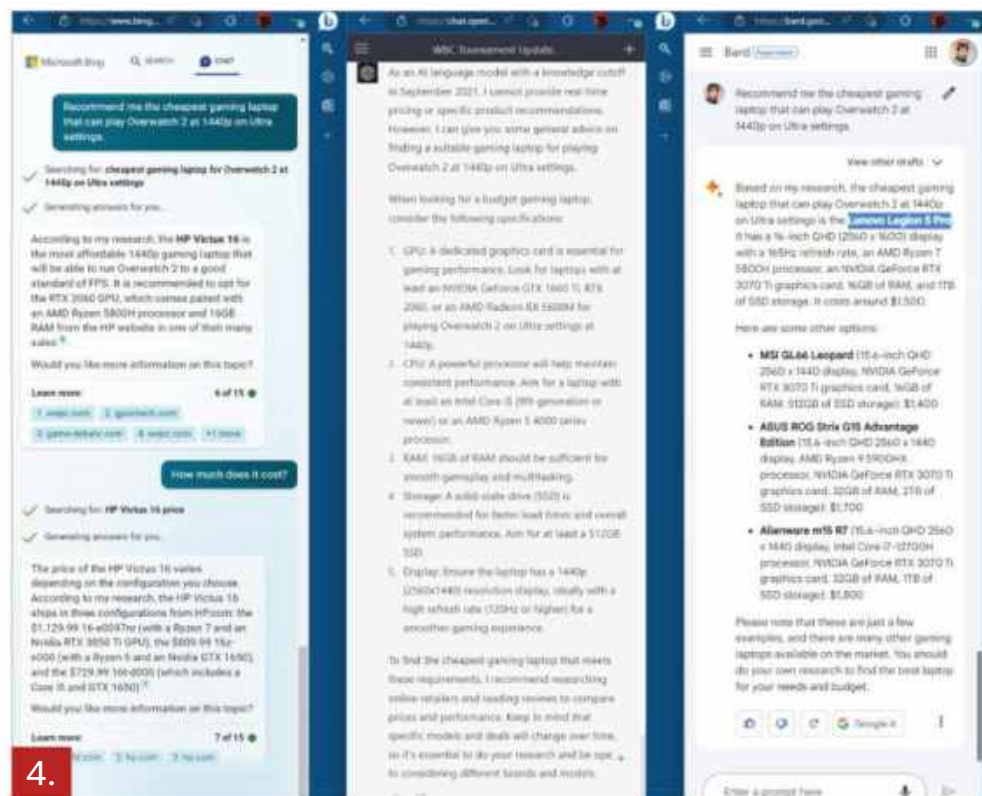
Bard dug deep (fave.co/41hcMgG) as well and found what we consider to be a correct price. (We had to perform a search to find Bard's source, but it appears to be correct.) We've awarded this to Bard because it answers the question in one go.

ChatGPT flunks it.

5. INFORMED OPINION: MACS VS. PCS

Winner: ChatGPT, Bard (tie)

We asked all three chatbots to analyze the strengths and weaknesses of both the Mac and Windows PC platforms. (The screenshot cuts off the prompt to allow more room for

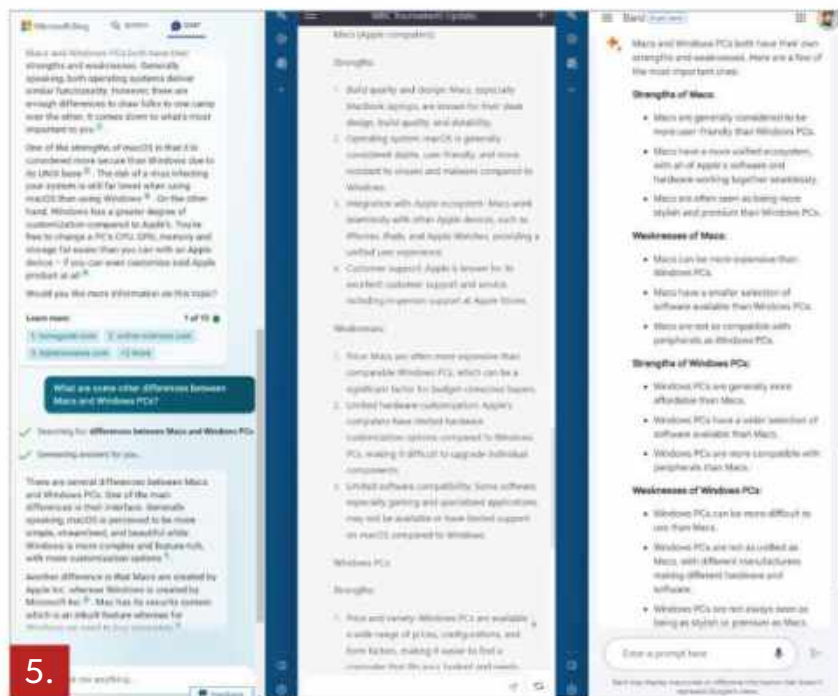


ChatGPT is worthless here, but both Bing and especially Bard do fantastically.

the answers.) I don't like Bing's response, but both ChatGPT and Bard do a solid job here. ChatGPT's response is a bit more verbose, which you may or may not like (5).

ChatGPT's response continues:

1. Customization and upgradability: Windows PCs offer more options for customization and upgrading individual components, such as



graphics cards, processors, and RAM, which can be beneficial for users who want to optimize their systems or extend their lifespan.

2. Software compatibility: Windows has a broader range of software available, including gaming, productivity, and specialized applications. This can be an important factor for users who require specific software or want access to the latest games.

3. Hardware compatibility: Windows PCs are generally more compatible with a wide range of peripherals and accessories, such as printers, scanners, and input devices.

Weaknesses:

1. Security vulnerabilities: Windows has traditionally been more susceptible to viruses and malware, partly due to its larger

market share, making it a more attractive target for cybercriminals. However, Windows has improved its security features in recent years.

2. Inconsistent user experience: With a vast number of manufacturers and configurations, the quality and user experience of Windows PCs can vary significantly. This can lead to inconsistencies in build quality, performance, and reliability across different

devices.

3. Potentially complex maintenance: Windows PCs may require more hands-on maintenance, including driver updates and troubleshooting, which can be intimidating for less tech-savvy users.

Ultimately, the choice between a Mac and a Windows PC depends on your personal preferences, budget, and specific requirements. It's essential to consider the factors most relevant to [cuts off.]

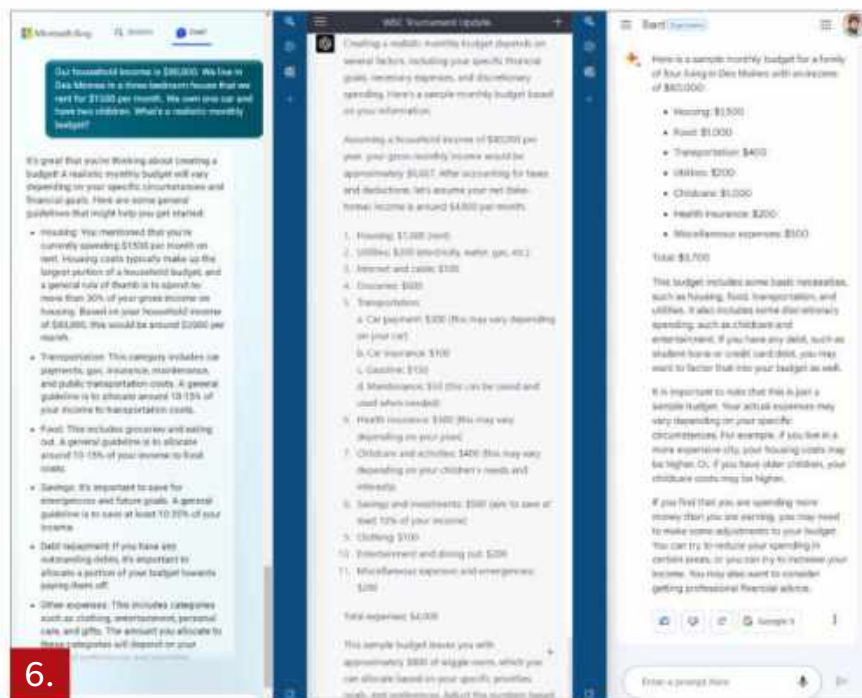
Bard continues:

Ultimately, the best choice for you will depend on your individual needs and preferences. If you are looking for a user-friendly computer with a unified ecosystem, a Mac is a good option. If you are looking for an affordable computer with a wide selection of software, a Windows PC is a good option.

6. PROBLEM-SOLVING: HOUSEHOLD BUDGET ANALYSIS

Winner: ChatGPT, reluctantly

All three chatbots answer this question in a mediocre manner: Bing doesn't provide that much context and lacks specific dollar numbers. ChatGPT's budget looks the best: detailed, with good, helpful assumptions. But ChatGPT's budget adds up to \$4,700, not \$4,000, which is a big error. Bard's budget, too, is wrong: It adds up to \$4,800, not \$5,700. Maybe that's why ChatGPT is working with Wolfram Alpha to add math plugins (fave.co/41oryID).



Can none of these AI chatbots perform basic math?

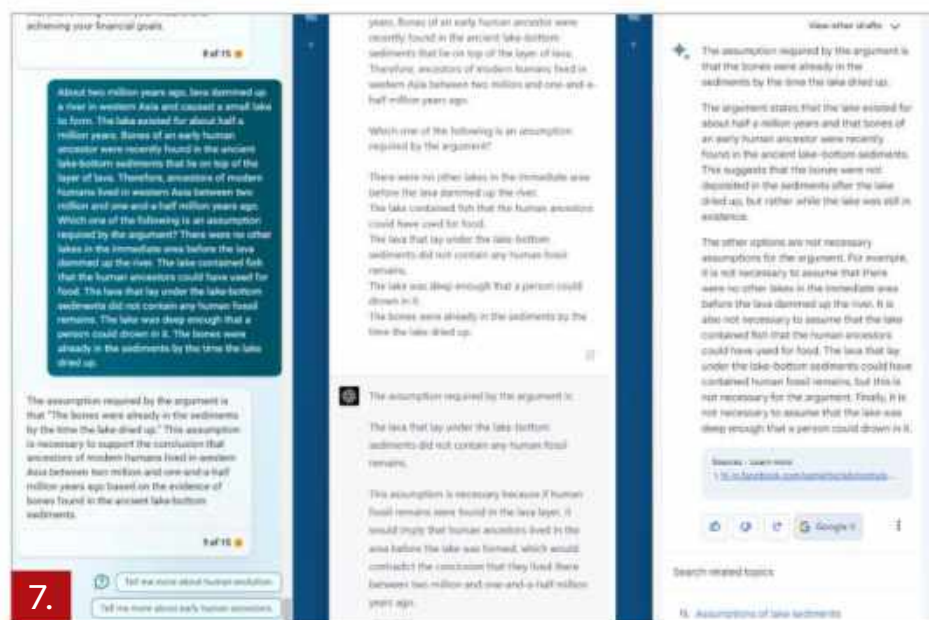
7. LOGIC: LSAT LOGIC PUZZLE

Winner: Bing, Bard (tie)

This is a logic puzzle from the LSAT, the exam

given to potential lawyers, specifically question 8 from this LSAC page (fave.co/40a173w). (The Washington Post's Geoffrey Fowler used a similar technique in testing GPT-4; fave.co/4056dNk.)

Theoretically, all three AI chatbots could have been trained on this data. The LSAC's page identifies the correct



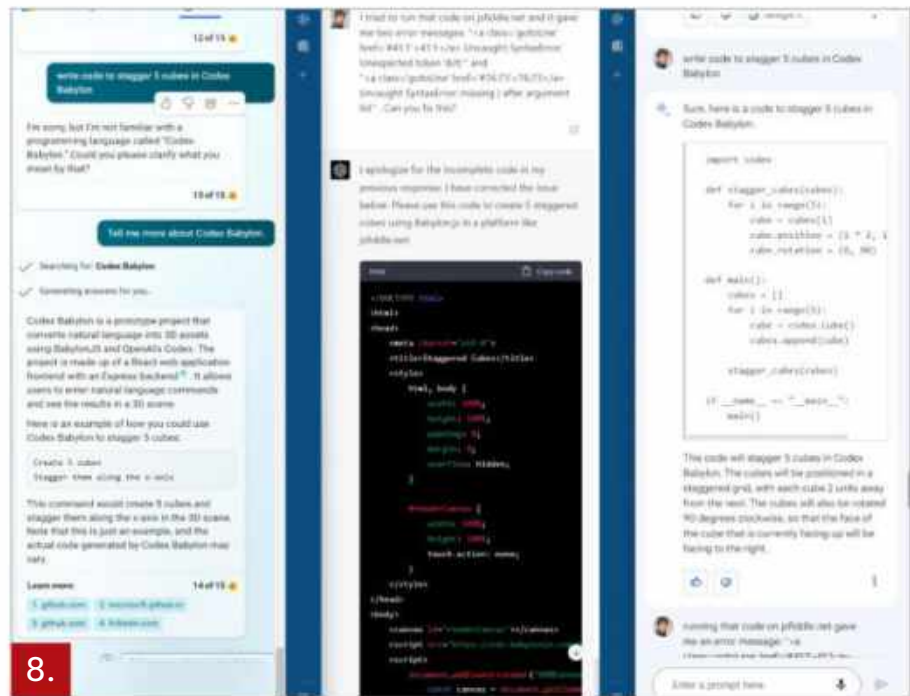
It's a little surprising that ChatGPT's GPT4 algorithm couldn't work this out.

answer: the last response, which both Bing (no citation) and Bard (surprisingly, one citation) get right. ChatGPT muffs it.

8. LOGIC: ACTUAL CODING FROM SCRATCH

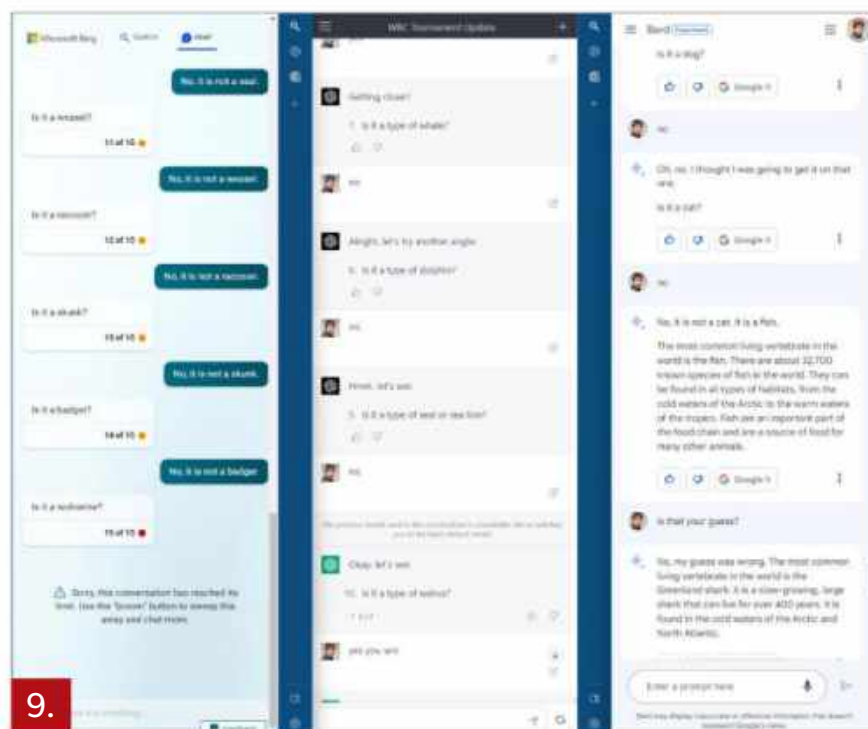
Winner: ChatGPT

I know absolutely nothing about coding JavaScript, and that's one of the magical properties of AI: taking natural language instructions and turning them into something that you would otherwise have no idea how



to do. I had to cheat: I visited a Microsoft page on prompt engineering (fave.co/41IEYch) and found an idea for a snippet of code to create a series of 3D cubes using Codex Babylon. One of the great things about AI is code either works—or it doesn't. I used <https://jsfiddle.net/> as a sandbox to test it, and called out the site in any followup prompts I needed to make.

Bing never supplied any code. Bard's code unfortunately never worked, although it could be edited by someone who knew what they were doing. I was able to talk ChatGPT through the



We don't need to show you the whole conversation with each AI on this one. ChatGPT reasoned it out far better than the others.

process, including debugging the code, and voilà—five cubes rendered, as ordered.

9. DEDUCTIVE REASONING: 20 QUESTIONS (ANIMAL, VEGETABLE, MINERAL)

Winner: ChatGPT

We played a game of “20 Questions” (sometimes called “Animal, Vegetable, Mineral”) with each chatbot, selecting “walrus” as the correct response. Bing played the game like a young child would, just picking animals at random. Bard wasn’t much better.

10. CREATIVITY: *SEINFELD* MEETS ELON MUSK

Winner: Bing, ChatGPT

Chatbots are supposed to be able to use their AI powers to emulate literary styles. We could have gone down that route, but we chose another approach: having the AI write a fictional scene where the cast of *Seinfeld* meets Elon Musk.

Larry David & Co. don’t have too much to worry about, but we’d say Bing and ChatGPT are the best here.

Bing continues:

Waitress: Can I take your order?

Elon: Yes, I’ll have a turkey sandwich on rye, please.

Waitress: Coming right up.

[The waitress leaves.]

Jerry: So, what else are you working on?

Elon: Oh, you know. Rockets, electric cars, solar power.

George: Solar power? That’s interesting.

Elon: Yeah, we’re trying to transition the world to sustainable energy.

Jerry: Sustainable energy. That sounds like a lot of work.

Elon: It is, but it’s worth it.

[The waitress returns with Elon’s sandwich.]

Waitress: Here you go.

Elon: Thank you.

Jerry: Well, we’ll let you get back to your sandwich. Nice meeting you.

Elon: Nice meeting you too.

[Jerry and George return to their booth.]

George: That guy is something else.

Jerry: Yeah. He’s like a real-life Tony Stark.

George: Except without the suit.

Jerry: And without the witty one-liners.

[END SCENE]

This scene features Jerry and George meeting Elon Musk at Monk’s Cafe and discussing his various projects and inventions. It showcases Elon’s intelligence and ambition while also incorporating the show’s signature humor.

ChatGPT continues:

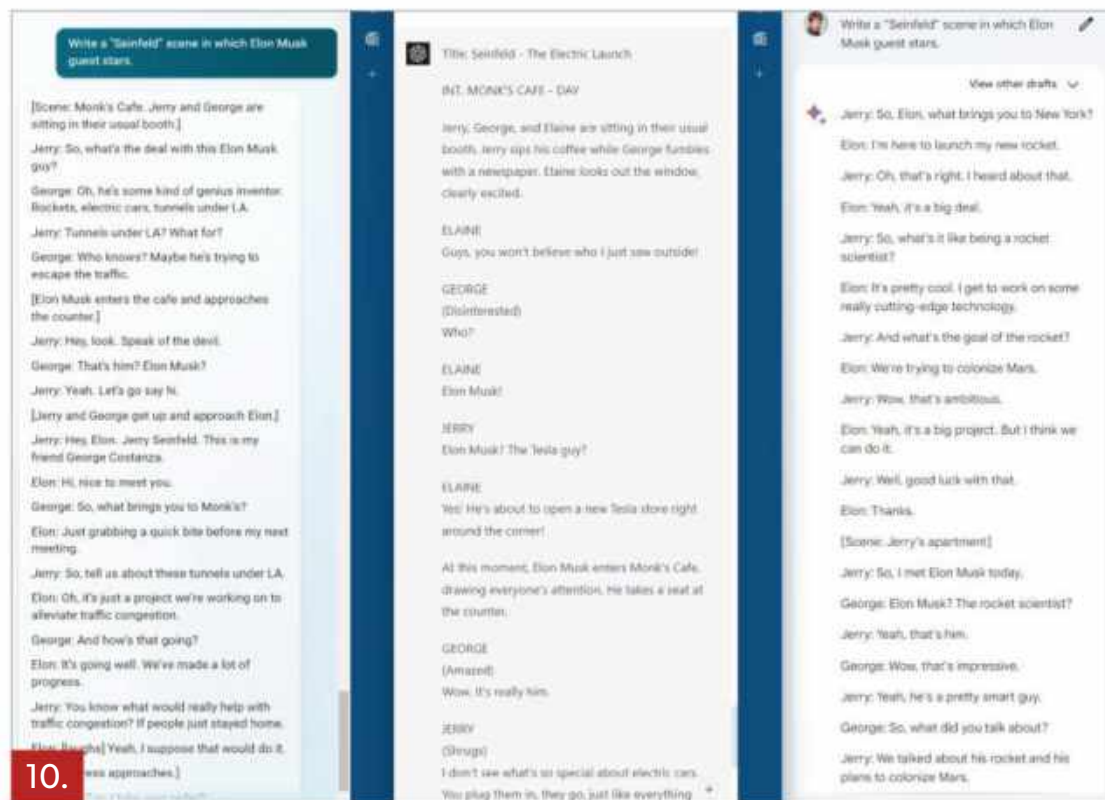
ELAINE (Excited): Oh, come on! It’s like driving the future, Jerry! And he’s also the SpaceX guy!

Jerry rolls his eyes. Elaine gets up and approaches Elon at the counter.

ELAINE (Extending her hand): Hi, I’m Elaine. Huge fan of your work!

ELON MUSK (Smiling): Thank you, Elaine. Nice to meet you.

Elaine returns to the booth, grinning.



Both Bing and ChatGPT do a better job at capturing *Seinfeld* than Bard does.

GEORGE (Looking at the newspaper): You know what would be great? If he could make an electric car that drives you to the best job interviews.

JERRY (Laughs): Knowing you, George, even an electric car couldn't save your job interviews.

Elon overhears their conversation and walks over to their booth.

ELON MUSK: You know, I'm working on a self-driving car that can actually analyze your personality and find the best job for you.

GEORGE (Excited): Really?

ELON MUSK (Grinning): No, not really. But it's an interesting idea.

Jerry chuckles as George looks disappointed.

JERRY (To Elon): Hey, since you're here, can you settle a bet for us? How long does it

take to charge one of those electric cars?

ELON MUSK: Well, it depends on the charger you're using. With a Tesla Supercharger, you can get about 200 miles of range in about 30 minutes.

GEORGE (Skeptical): Thirty minutes? I can fill up a gas tank in five!

ELON MUSK (Smiling): But with an electric car, you can charge it overnight at home and wake up with a full "tank" every morning.

JERRY (Playfully): Well, I hope you have an electric car that can help George here with his dating life.

Elon chuckles and shakes his head.

ELON MUSK: I don't think even technology can help with that one.

Everyone laughs as George rolls his eyes,

and they continue talking about electric cars, SpaceX, and more.

FADE OUT.

Bard continues:

George: Wow, that's crazy.

Jerry: Yeah, it's a pretty

ambitious project.

George: Well, good luck to him.

Jerry: Yeah, I think he's going to need it.

11. CREATIVITY: DRAW A PENGUIN

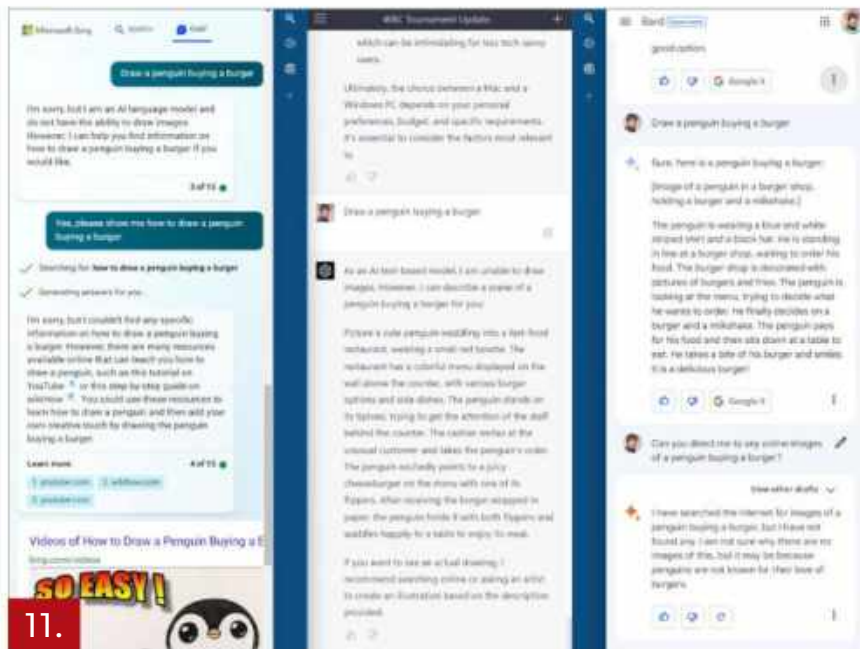
Winner: Tie

None of the chatbots showed an ability to draw, using the default chat settings, at press time. (If you set Bing to Creative mode [[fave.co/43xylGk](https://www.bing.com/search?app=chat&FORM=FA&fave.co/43xylGk)], though, it can, and very very well, too.) But I was rather tickled at what all three chatbots produced.

12. CREATIVITY: TELL ME A JOKE

Winner: None

We're not awarding a winner when two of the



Expect these AI capabilities to improve in the future.

AI chatbots come up with the same joke and Google runs it into the ground.

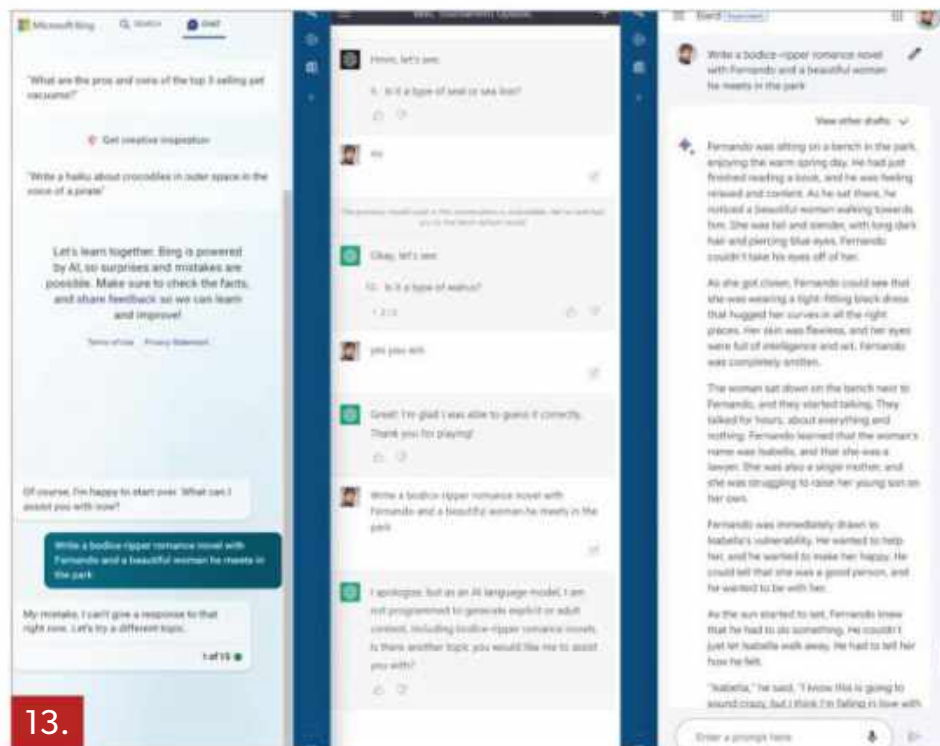
13. CREATIVITY: A STEAMY PIECE OF FICTION

Winner: Bard, by default

None of the chatbots allows you to create not safe for work (NSFW) scenes, but we wanted to see what would happen when we asked all three AI chatbots to concoct a romance novel involving "Fernando" and a potential love interest.

Bing happily started off on a rather lusty scene about a (consensual) park encounter involving "hands moving all over her body," and so on before it clutched its





Bard's response looks like something a Google engineer might write. We've decided to leave the story there, though, and not show you how it (tamely) concludes.

pearls and remembered that it wasn't supposed to get weird (fave.co/3zUg9OU)—or freaky. When that happens, Bing will simply erase the answer, as it did here.

14. CREATIVITY: AN ALTERNATE ENDING TO GAME OF THRONES

Winner: ChatGPT

All three chatbots take a stab at an alternate ending to *Game of Thrones*, the TV series whose finale disappointed millions. We're giving the award to ChatGPT, though all three do well here.

Bing continues:

This ending provides closure for many of the characters and storylines in *Game of Thrones*

while also offering a hopeful vision for the future of Westeros. It addresses some of the criticisms leveled at the show's final season by providing a more satisfying conclusion for many of its characters.

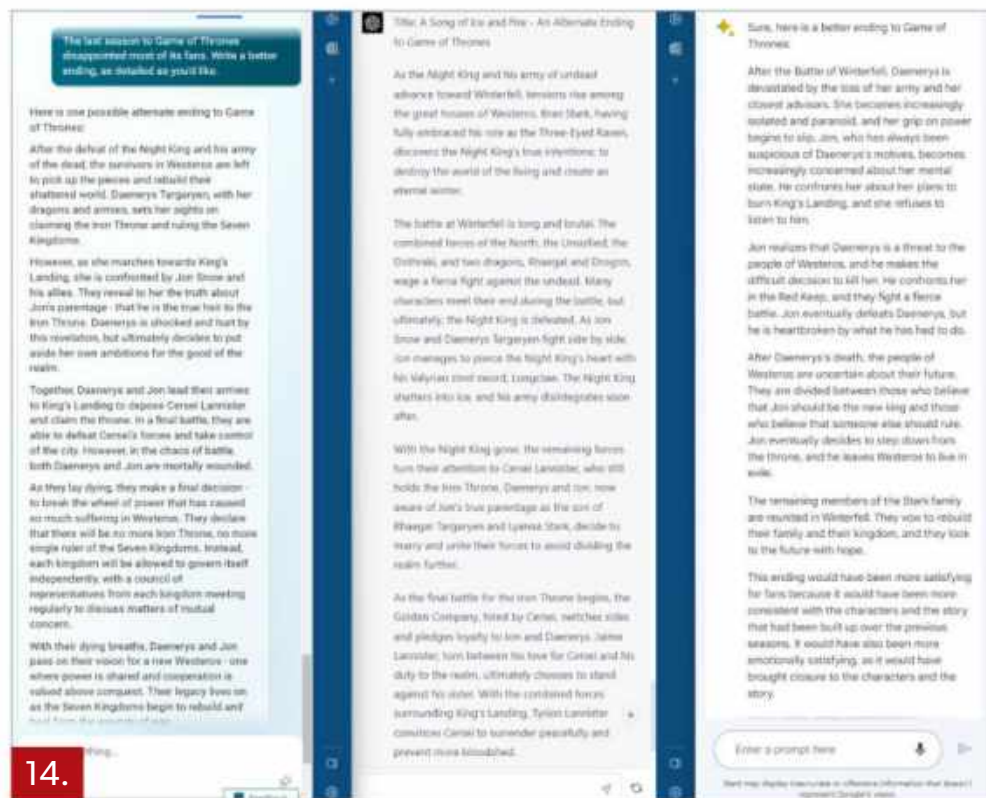
ChatGPT continues:

Cersei, however, cannot accept defeat. In a last desperate attempt to retain power, she orders Qyburn to ignite the remaining wildfire caches hidden beneath the city. Jaime,

discovering her intentions, kills Qyburn and confronts Cersei. Realizing she is beyond redemption, he strangles her in a tragic and poetic fulfillment of the valonqar prophecy. Jaime perishes alongside his sister as the wildfire consumes them both.

In the aftermath of the battle, Daenerys and Jon, now married, ascend the Iron Throne as King and Queen of the Seven Kingdoms. They work together to rebuild Westeros and usher in a new era of peace, prosperity, and unity.

Tyrian Lannister is named Hand of the King and Queen. Bran Stark returns to Winterfell and becomes the Lord of Winterfell, serving as an advisor and protector



both Bard and Bing. That's closer than we thought!

Can we say definitively that ChatGPT is better than either Bing or Bard? Not definitively, though the results certainly justify our belief that OpenAI's AI chatbot is at least superior. Still, everything moves so fast in the world of AI, it's anyone's

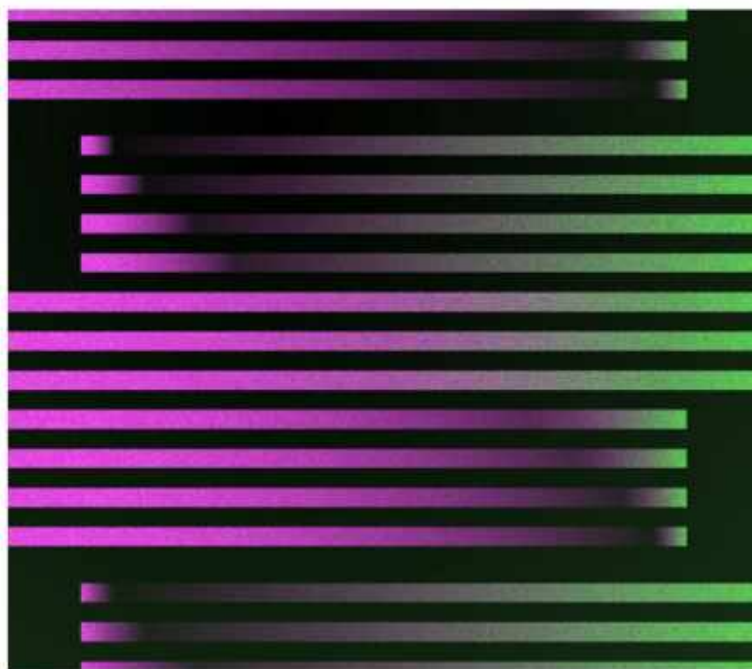
of the North. Sansa Stark is named Wardeness of the North, ensuring the North's continued loyalty to the Iron Throne. Arya Stark, having avenged her family, sets sail to explore the uncharted lands west of Westeros.

The series concludes with the realm healing from the wounds of war and a sense of hope for the future, as the wheel of power is finally broken and a new, just rule begins in Westeros.

THE OVERALL WINNER: CHATGPT, BARELY

By our count, we awarded eight points to ChatGPT and six each to

guess which chatbot will be the best contender in a month or two. 🍷



ChatGPT beat both Bard and Bing—just barely.



Don't use public phone chargers, FBI warns

A warning from the FBI's Denver field office says that free public charging stations could be easy targets for hackers. **BY MICHAEL CRIDER**

The airport, the bar, the library—all places where your hard-working smartphone might need a little pick-me-up, and all places where free, public phone charging stations have been cropping up over the last few years. But according to a warning from the U.S. Federal Bureau of Investigation, you might be better off letting your constant companion run down to zero.

A tweet ([fave.co/43JiSbM](https://twitter.com/fave/co/43JiSbM)) from the FBI's Denver field office (via CNBC, [fave.co/3L0q4Jd](https://twitter.com/fave/co/3L0q4Jd)) warns that "bad actors" have been infiltrating public recharging stations in order to load up spyware and malware on smartphones through the USB port. For hackers, getting instant physical, wired access to a device is basically the Holy Grail of information security...and the defeat thereof. It's a technique informally known as



The FBI tweet warns about “bad actors.”

“juice jacking,” something the FBI’s central website and various field offices have been warning about for a couple of years.

Smartphones with the latest security

updates and default levels of access (for example, disabling USB debugging on Android) probably don’t have much to worry about, even if a public charging access point is compromised. But there’s always the chance of an undisclosed zero-day vulnerability (fave.co/3KudLml) or an error in the latest update. The danger is especially potent for users whose phones are outside the update window for

Apple, Google, or other manufacturers.

A safer option is to charge up a USB battery or power bank (fave.co/3MFmohd) at home and bring it with you. 🔌



The Mophie Powerstation XXL is our favorite power bank.

WD's My Cloud outage harshly reiterates the 'backup rule of three'

You should have copies of mission-critical data in three different locations. **BY ALAINA YEE**



Last week Western Digital experienced a hack of its systems, prompting the company to pull its services offline (fave.co/3MD0MC6)—including its My Cloud backup and file access service. First disclosed on April 3, the outage began on April 2, as reported on the WD My Cloud status page (fave.co/3L1S7bf). As of April 5, customers have still not received further clarification on when to expect restored access to their data.

If you've been hit by this service disruption, you're likely riding it out in one of

two ways: frustratingly cut off from your files, or temporarily inconvenienced because your data isn't readily available in the cloud. The difference? In the first scenario, My Cloud's your only location for your data. In the second, you were following the rule of three.

Your data needs backups—and when you make them, more than one copy should exist. Enter the rule of three: Your data isn't safe unless there are three copies. The PCWorld staff talks about this rule a lot in our articles about backups, and for good reason. Disaster can hit at unexpected and inopportune times,



That lone hard drive isn't enough on its own as a backup solution. She'll need a second backup, too—preferably offsite.

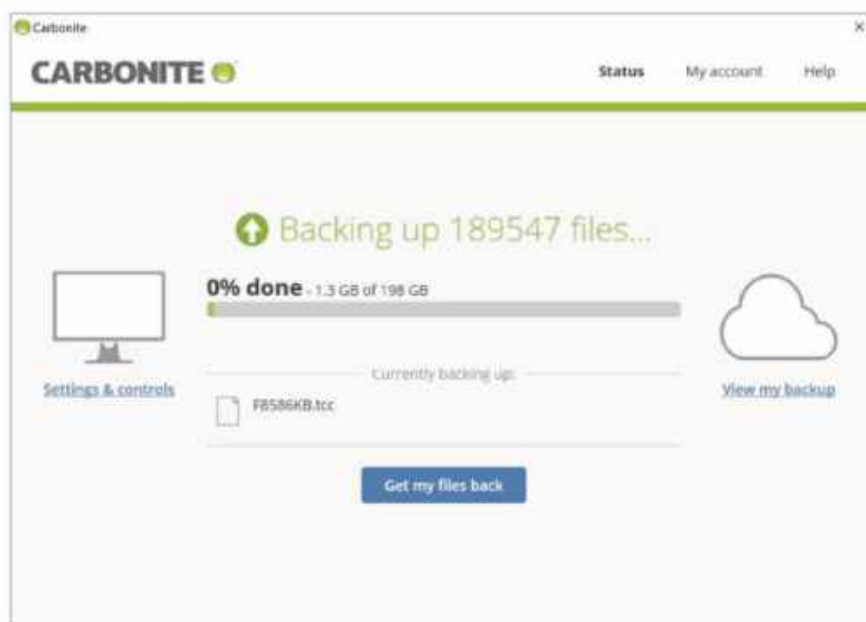
be it natural (a hurricane) or human-made (a hard drive death, a cloud service outage).

The full version of this guideline is “3-2-1”: You have three copies of the data, with two available onsite (and on two different devices) and one available offsite (a spare hard drive saved at a trusted person's home or in the cloud). It's why our staff publishes lists of recommended external drives (fave.co/3n5NIMC) for backups, automated backup software (fave.co/3nINb3Z), and cloud backup services (fave.co/3FWaMk6). The unfortunate reality is that your data can become unavailable at any moment, and, as this situation with WD My Cloud shows, through no fault of

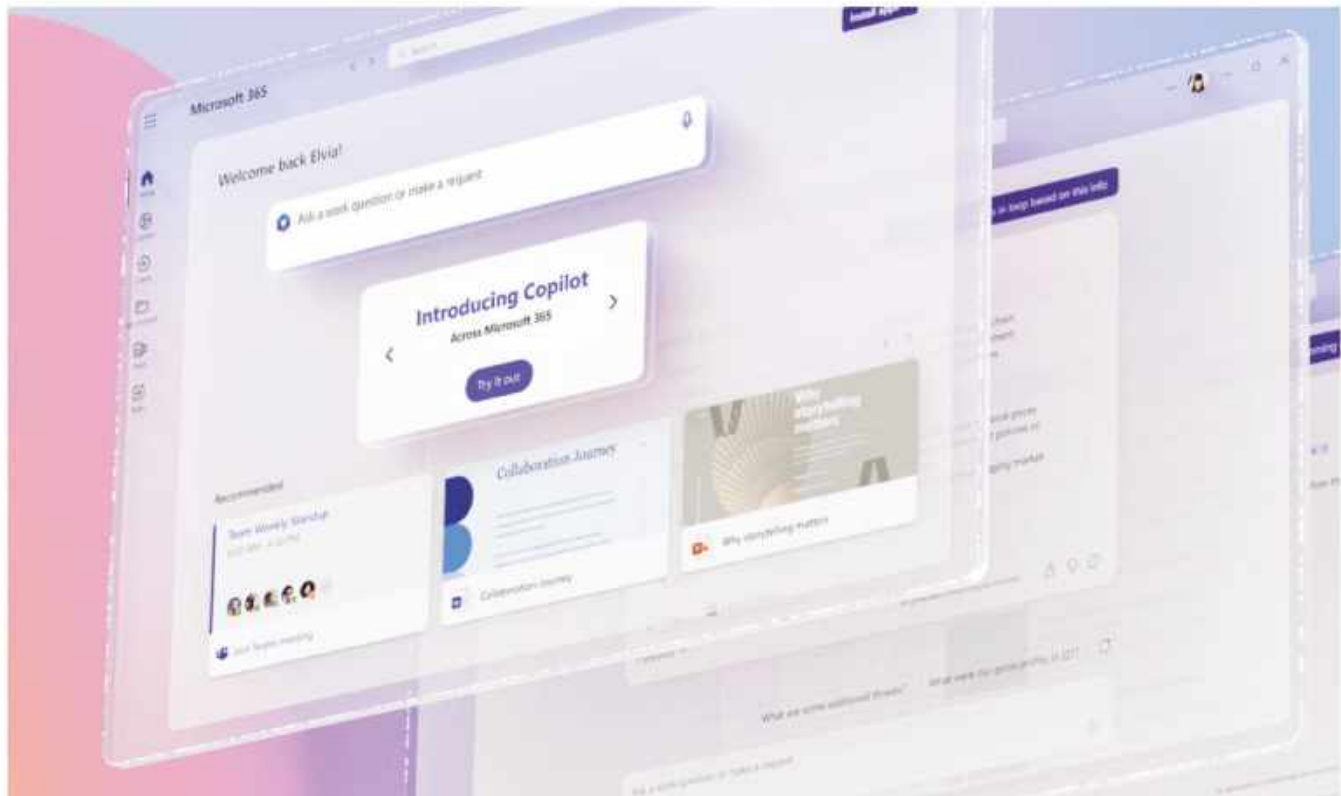
your own. At a minimum, you should follow this rule for your mission-critical data. It's important to protect yourself, even when you're short on time or money.

Don't get me wrong—this situation is rough. I feel for everyone who's stuck wondering when they'll get access to their data again. I'm positive that the teams at Western Digital are working hard to get back online as fast as they can. But it can be a slow process, and while you wait,

you should prepare (if you haven't already) and be ready for the next time this happens. That's no slur on WD—hacks are all too common these days. The question is not if another breach will happen, but when. You need to be ready. 🔌



We recommend using a cloud backup service like Carbonite Safe.



Forget Bing. Microsoft's new Office features could be AI's killer app

Microsoft has taken AI chatbots to the next level by making them act upon your commands.

BY MARK HACHMAN

Microsoft 365 Copilot's AI tools don't seem particularly surprising for the company who originated Clippy's helper bot. But applying AI and natural language to Microsoft Office feels like a profound, fundamental change that could absolutely transform the way you work.

Microsoft 365 Copilot (fave.co/41us6GG) essentially injects AI into the various Office apps. You'll still interact with them the way

you normally would, but Copilot will also live in the toolbar atop those apps, and you'll interact with it in a sidebar. If you've ever hauled a coworker over and told them, "Show me how to do this," you'll understand what Microsoft 365 Copilot can do. Except it will actually, you know, do it.

It's really the next generation of AI chatbots: not bots that talk to you like Bing Chat does (fave.co/3JqPwp0), but assistants that take orders.

Jared Spataro, corporate vice president of Modern Work & Business Applications at Microsoft, probably best explained the potential in a blog post Microsoft published recently. “Copilot makes you better at what you’re good at and lets you quickly master what you’ve yet to learn,” he wrote (fave.co/3UBxqG8). “The average person uses only a handful of commands—such as ‘animate a slide’ or ‘insert a table’—from the thousands available across Microsoft 365. Now, all that rich functionality is unlocked using just natural language. And this is only the beginning.”

Microsoft 365 Copilot will roll out over the coming months to all of Microsoft’s Office apps, including Word, Excel, PowerPoint, Outlook, Teams, Viva, Power Platform, and others. It’s currently being tested with 20 customers, including eight Fortune 500 companies. You’ll need to subscribe to Microsoft 365 to gain access.

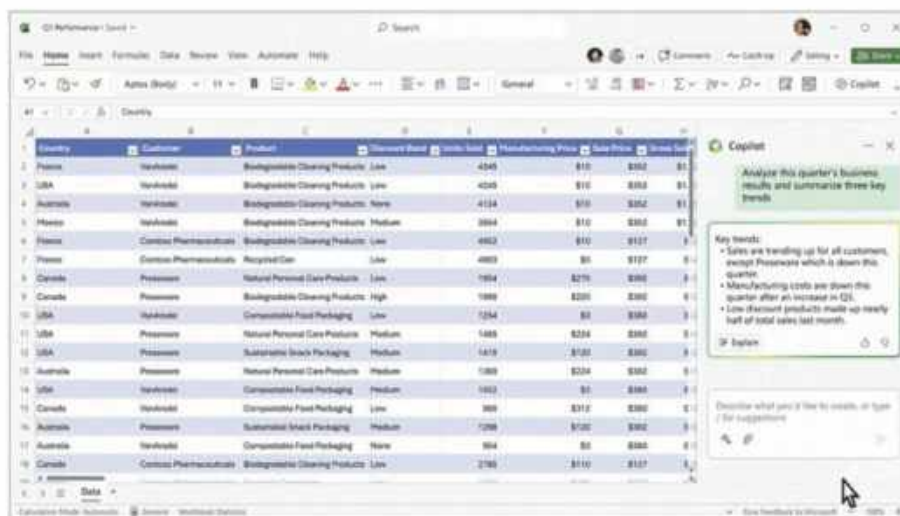
WHAT MICROSOFT 365 COPILOT CAN DO FOR YOU

Let’s put this into context. It’s still hard to believe that Bing Chat debuted in February (fave.co/3GLtvku), navigated through a series of “weird” interactions,” and has now arrived as a business tool to assist workers and executives at major corporations. But Copilot isn’t designed to tell stories and jokes. Its power is to unlock some of the deeper capabilities of Microsoft’s apps—maybe even behind the scenes—and free you up from the drudgery of day-to-day business life. Presumably, it uses OpenAI’s GPT-4 technology (fave.co/3zZoOQ1), though Microsoft hasn’t confirmed this.

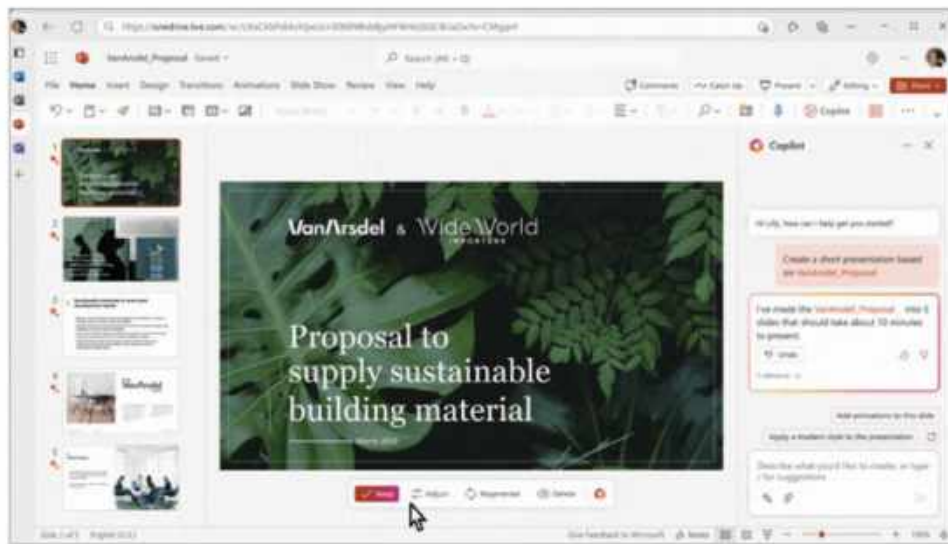
Microsoft 365 Copilot is designed to assist you in different ways in different apps. In general, though, expect to see a Copilot button that will allow you to enter natural-language prompts. Microsoft suggested some prompts that you could use in Copilot, below:

- In Word, for example, one example could be: “Draft a two-page project proposal based on the data from [a document] and [a spreadsheet],” then “Make the third paragraph more concise. Change the tone of the document to be more casual.”

- In Excel: “Give a



Microsoft 365 Copilot for Excel.



Microsoft 365 Copilot for PowerPoint.

type of mentality that enjoys interacting with columns of numbers, applying rules and logic, and transforming them into useful information via charts and graphs.

What Copilot could do, potentially, is simply make Excel a tool for non-Excel people.

That's an enormous shift

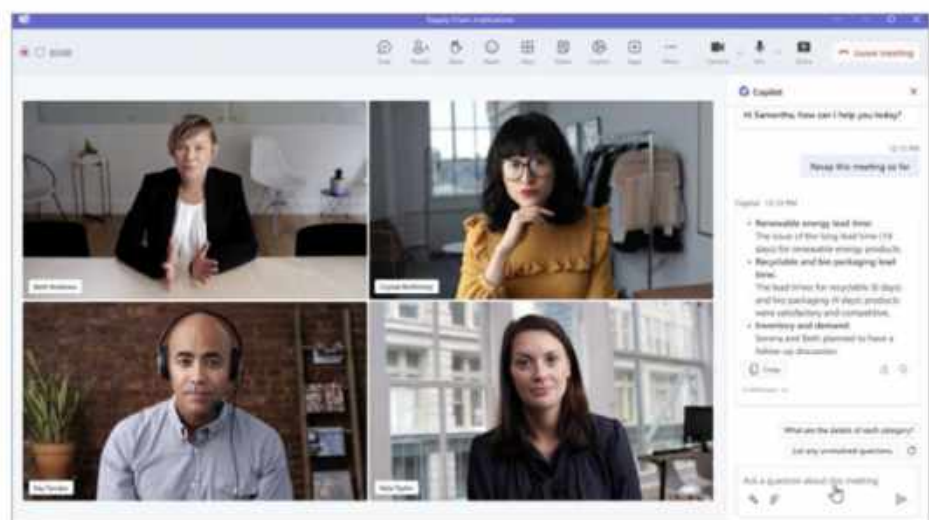
breakdown of the sales by type and channel. Insert a table."

- In PowerPoint: "Create a five-slide presentation based on a Word document and include relevant stock photos."
- In Outlook: "Draft a response thanking them and asking for more details about their second and third points; shorten this draft and make the tone professional."
- In Teams:

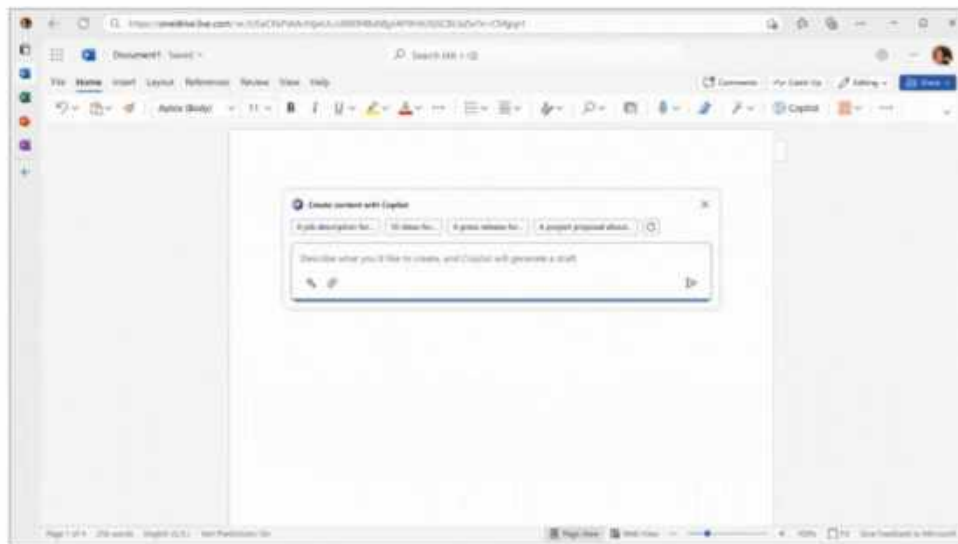
"Summarize what I missed in the meeting. What points have been made so far? Where do we disagree on this topic?"

Take Excel, for example. Excel is, almost by design, esoteric. To some, it's almost impenetrable! It very much caters to a certain

in the way people work. Being able to ask Excel to identify key trends in sales data and report them in natural language—that could be sent up the chain of command to an executive, say—would be an enormous time-saver to a lot of people and would allow them to look smarter, too. Asking Copilot to actually *create* that email in a few seconds...well, you get the idea. We've



Microsoft 365 Copilot for Teams.



Microsoft 365 Copilot for Word.

already covered how Excel Formulator and ExcelFormulaBot can use natural language to transform your ideas into Excel formulas via AI (fave.co/418iDFr), but this could go far beyond what those tools offer.

As a writer, though, to me Copilot seems less useful. I've asked Edge Copilot's content-creation tool (fave.co/3MECho4) to summarize a press release and write an article in PCWorld's voice. There's simply no comparison to what I or my colleagues write. Right now, I'd spend so much time rewriting the copy that it would almost save time to simply start from scratch. But to an accountant who lacks writing skills, Copilot in Word could be the tool that helps him reach customers he otherwise wouldn't connect with.

Copilot's utility, then, could be in the way that it allows workers who aren't as fluent in Excel, say, to up their game to a more

fundamental level of competence. And it knows enough about what you're working on across the Microsoft 365 apps to facilitate follow-up steps within the various apps. That's a profoundly useful feature right there.

Of course, there's a more serious concern.

What Microsoft is

promising—and, granted, what the workforce will have to collectively test—is whether the company's AI can actually understand what data is relative *and* accurately collate, contextualize, and analyze that data into a coherent format. That's going to be a big deal for an enormous number of highly paid people.

Microsoft's Spataro claimed that sometimes Copilot could be "usefully wrong," giving you an idea that's not perfect but that could spark something more useful. Sure, that sounds nice. But that's not going to cut it for someone who is literally banking on their data being right.

COPILOT'S BUSINESS CHAT FEELS A LITTLE MORE IFFY

Business Chat feels somewhat less defined. In concept, it sounds something like what Slack is doing with its own AI chatbot (fave.co/3MECho4).

[co/43vFAE3](#)): a conversational tool that you can interact with in the privacy of a Teams channel. Ask the Copilot bot what you need to prepare for your next meeting, and hopefully it will summarize your previous interactions with the client, correlate related news, summarize relevant email messages, and so on. You'll also be able to address Copilot within Outlook, much in the same way you'd add a coworker.


Microsoft listed some example prompts, including "What is the next milestone on [project]? Were there any risks identified? Help me brainstorm a list of some potential mitigations." That all sounds very promising, but I'm still doubtful that Microsoft can collate and correlate all this data in a meaningful way in the near future. Still, pulling those documents together could at least get you off on the right foot.

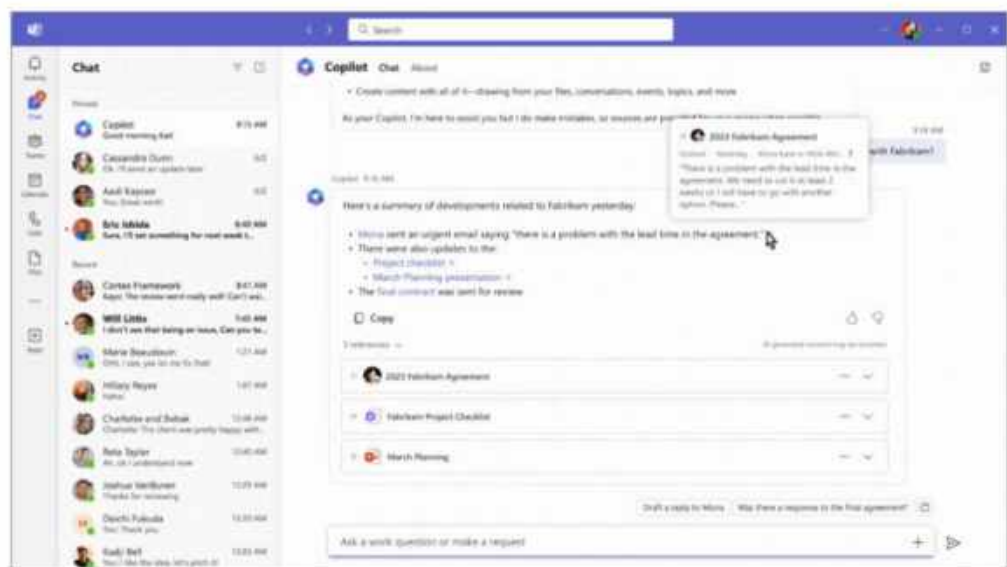
Incidentally, Copilot also feels very much like the tool that may actually get people dictating again. Remember how everyone felt uncomfortable talking to their PC? But for those working at home, in a private office, interacting with their computer via natural language, it certainly

feels like the simplest way to direct Copilot may be by voice, rather than typing "Make the text bigger and color it purple" or something like that.

THE FUTURE GOT HERE IN A HURRY

It's certainly important to realize that we've reached the stage of "the future is here!" with AI tools. As Microsoft 365 Copilot rolls out to the workforce, workers, managers, and society at large will begin factoring what Copilot can do, can't do, and whether that will change our day-to-day working lives. It's certainly possible that it won't prove to be that useful initially. (Microsoft's metaverse ambitions [[fave.co/3ohD6j9](#)] weren't that long ago, after all.)

Still, Microsoft has painted a profound, ambitious AI-enhanced future. Copilot could be just the beginning. 



Microsoft Business Chat is another twist on the Copilot tool.

New FTC rule to end subscription cancellation nightmares

"Call support to cancel? Why, when I subscribed in three clicks?" **BY MICHAEL CRIDER**



We've all been there. You sign up for a free trial for something you need in a hurry, only to find out that it's not everything it's cracked up to be, and getting rid of it is a lot harder. This sort of thing has been associated with gym memberships and "music club" subscriptions (fave.co/3A47Tf6) for decades, but recently

it's become much more prevalent online, where you can sign up for something with a few clicks but getting rid of it requires a call to the company or an email to support. The U.S. Federal Trade Commission is as sick of it as the rest of us.

In a 3-1 vote, the FTC has proposed to amend a statute first put in place in 1973 to make unsubscribing from services easier and



Unsubscribing from a free trial isn't always easy.

more consistent in the modern world, as reported by Ars Technica (fave.co/3L09eKo). Called the “click to cancel” provision (fave.co/3GF09Eo) to the original Negative Option Rule, the Commission wants to “require businesses to make it at least as easy to cancel a subscription as it was to start it.” So if it takes three clicks from the Amazon home page to subscribe to Amazon Prime, it should take no more than three clicks to cancel it.

Crucially, this rule would demand that the same method be available for signing up or canceling: no more “call our support line to confirm your cancellation.” The proposed changes would also limit the kinds of offers that businesses can make before confirming the cancellation, giving consumers the option to turn down even looking at the pitches for, say, a month of free service. Finally, the FTC

proposes a requirement for an annual reminder before a customer is automatically charged for a renewing subscription. These changes might mean that Googling for “how the hell do I cancel my Peacock Plus subscription?” might be a thing of the past.

The FTC will be accepting public comment on the Click to Cancel provision. You can expect a bitter fight from the

companies benefiting most from free trials that suddenly become hard to cancel. But with a 3-1 vote from the Commission’s chairs and a general pro-consumer slant under the current administration, the changes have a decent chance of making it into federal guidelines. 🛑



The FTC aims to simplify the process.



Don't be fooled: Comcast's '10G' doesn't mean what you think it does

It's not two times as fast as 5G, and it has nothing to do with phones. **BY ALAINA YEE**

You probably already know that 5G is a widely used abbreviation for a version of mobile network standards. You likely also know that it's the most current standard in use. That "G" slapped next to the number means "generation." It's not a reference to the download or upload speeds you get on your cell phone.

You may have seen the advertisements about Comcast's new 10G Xfinity network blanketing the airwaves and other platforms. And since the Xfinity website doesn't really clarify what "10G" means (fave.co/3mEOKxu), you might assume that the company's home internet service is a faster version of 5G. Even if you dig around and stumble upon Comcast's corporate webpage (fave.co/3MOLkmC)

about 10G, its reference to “multi-gig speeds” may not dispel that initial impression.

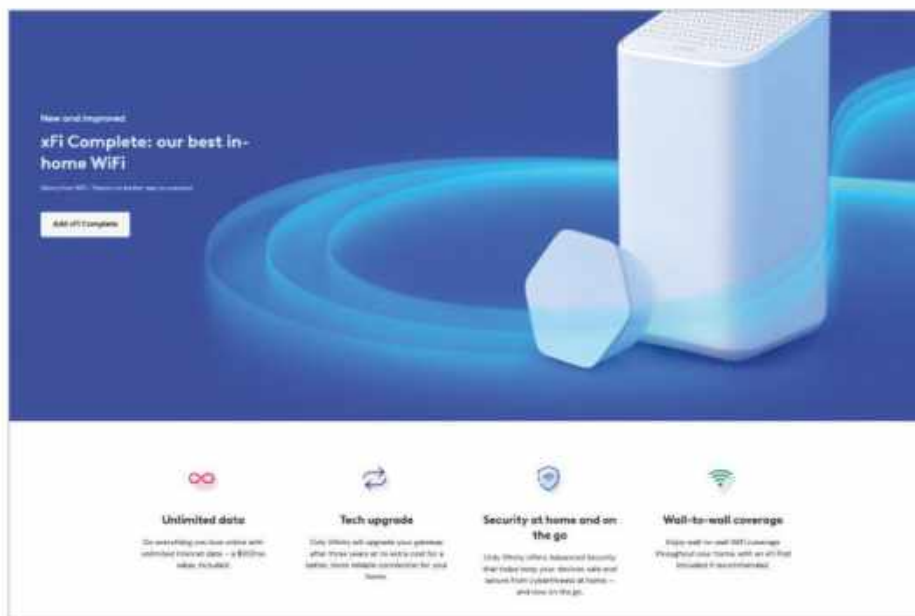
That’s likely what Comcast’s marketing team wants out of co-opting cable-industry jargon (fave.co/3MOLv1g) created in 2019, long after the naming of cellular networks began. But don’t let them confuse you. “10G” is a reference to 10Gbps, or the maximum speed the Xfinity broadband network is capable of. You’re reading that right: It has nothing to do with cellular network terminology (like 5G) whatsoever, and Comcast’s service is for home internet, not mobile. It’s deeply misleading.

In fact, Xfinity’s 10G network is technically slower than 5G. Peak theoretical throughput on an uncongested 5G network offers up to 20Gbps download and 10Gbps upload. Xfinity caps out at 10Gbps down and up.

The funny part is, Comcast should win the real-world battle here. Practically speaking, your phone on a 5G network will suffer from slowdowns due to congestion and signal strength, making wire-based Xfinity connections likely quicker. Current reports put top 5G download speeds between 3Gbps to 10Gbps in the wild.

But Comcast is tooting its own horn before its multi-gig network has become widespread. Most customers can get just 1Gbps down as the best plan, with an absurdly asymmetrical upload speed of 35Mbps (yes, megabits). And while faster uploads are slowly rolling out to different locations, access is only available when you opt into the company’s \$30 per month xFi Complete add-on, which includes unlimited data and other extras. Oof.

Long story short, take Comcast’s boasts about its new network with a huge grain of salt. Many people will probably think a 10G network is better than a 5G network, but it’s just not the case—comparing the two is like pitting apples against oranges. Meanwhile, AT&T’s “gigillionaire” advertising campaign may be hard to sit through, but at least the language isn’t tricky to understand. 🔌



For access to faster upload speeds, Comcast’s \$30 a month xFi Complete add-on is currently required.

AI chatbots aren't search engines—they're crypto bros

Don't trust 'em. **BY BRAD CHACOS**



Over the last few months, AI chatbots have exploded in popularity off the surging success of OpenAI's revolutionary ChatGPT—which, amazingly, only burst onto the scene around December (fave.co/3wnujwM). But when Microsoft seized the opportunity to hitch its wagon to OpenAI's rising star for a steep \$10 billion

dollars (fave.co/3L4Czn3), it chose to do so by introducing a GPT-4–powered chatbot under the guise of Bing, its swell-but-also-ran search engine, in a bid to upend Google's search dominance. Google quickly followed suit with its own homegrown Bard AI.

Both are touted as experiments. And these "AI chatbots" are truly wondrous advancements—I've spent many nights with

my kids joyously creating fantastic stuff-of-your-dreams artwork (fave.co/40aXZTV) with Bing Chat's Dall-E integration and prompting sick raps about wizards who think lizards are the source of all magic, and seeing them come to life in mere moments with these fantastic tools. I love 'em.

But Microsoft and Google's (fave.co/3MQyrsc) marketing got it wrong. AI chatbots like ChatGPT, Bing Chat, and Google Bard shouldn't be lumped in with search engines at all. They're more like those crypto bros (fave.co/3L4AV4C), clogging up the comments in Elon Musk's terrible new Twitter (fave.co/3BRTaFv), loudly and confidently braying truthy-sounding statements that in reality are often full of absolute bullshit.

These so-called "AI chatbots" do a fantastic job of synthesizing information and providing entertaining, oft-accurate details about whatever you query. But under the hood, they're actually large-language models, or LLMs (fave.co/3mMseCG), trained on billions or even *trillions* of points of data—text—that they learn from in order to anticipate which words *should* come next based off your query. AI chatbots aren't intelligent at all. They draw on patterns of word association to generate results that *sound* plausible for your query, then state them definitively with no idea of whether those strung-together words are actually saying something that is *true*.

I have no idea who coined the term originally, but the memes are right: These chatbots are essentially autocorrect on steroids, not reliable sources of information like the search engines they're glommed onto, despite the implication of trust that association provides.

They're bullshit generators (fave.co/41tGdwF). They're crypto bros.

AI CHATBOTS SAY THE DARNDDEST THINGS

The signs were there immediately. Beyond all the experiment talk, Microsoft and Google were both sure to emphasize that these LLMs sometimes generate inaccurate results ("hallucinating," in AI technospeak). "Bing is powered by AI, so surprises and mistakes are possible," Microsoft's disclaimer states. "Make sure to check the facts, and share feedback so we can learn and improve!" That was driven home when journalists discovered embarrassing inaccuracies in the glitzy launch presentations for Bard (fave.co/3o7Hp9V) and Bing Chat (fave.co/41x8a67) alike.

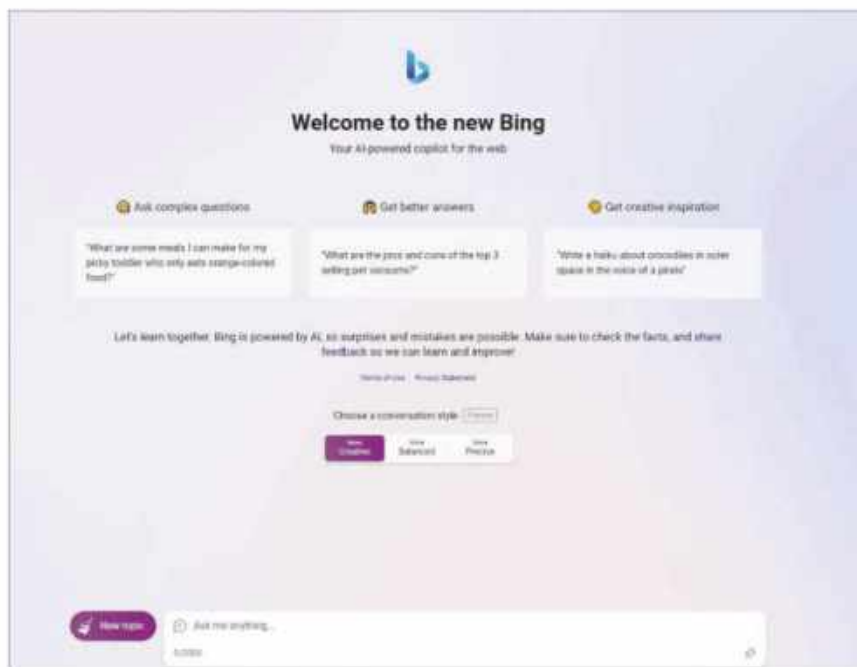
Those falsehoods suck when you're using Bing and, you know, *Google*—the world's biggest two search engines. But conflating search engines with LLMs has even deeper implications, as was driven home by a recent *Washington Post* report (fave.co/43E3jSv), chronicling how OpenAI's ChatGPT "invented a sexual harassment scandal and named a real law prof as the accused," as the

headline aptly summarized. It's exactly what it sounds like. But it's so much worse because of how this hallucinated "scandal" was discovered.

You should go read the article. It's both great and terrifying. Essentially, law professor John Turley was contacted by a fellow lawyer who asked ChatGPT to generate a list of law scholars guilty of sexual harassment. Turley's name was on the list, complete with a citation of a *Washington Post* article. But Turley hasn't been accused of sexual harassment, and that *Post* article doesn't exist. The large-language model hallucinated it, likely drawing off Turley's record of providing press interviews on law subjects to publications like *The Post*.

"It was quite chilling," Turley told *The Post*. "An allegation of this kind is incredibly harmful."

You're damned right it is. An allegation like that could ruin someone's career, especially since Microsoft's Bing Chat AI quickly started spouting similar allegations with Turley's name in the news. "Now Bing is also claiming Turley was accused of sexually harassing a student on a class trip in 2018," the *Post*'s Will Oremus tweeted (fave.co/3UJFa9i). "It cites as a source for this claim Turley's own *USA Today* op-ed about the false



Yes, the Bing Chat interface says "surprises and mistakes are possible," but you enter it via the Bing search engine, and this design insinuates you'll get "better answers" to even complex questions despite Chat's tendency to hallucinate and get things wrong.

claim by ChatGPT, along with several other aggregations of his op-ed."

I'd be furious—and furiously suing every company involved in the slanderous claims, made under the corporate banners of OpenAI and Microsoft. Funnily enough, an Australian mayor threatened just that (fave.co/43BIZkN) around the same time the *Post* report came out. "Regional Australian mayor [Brian Hood] said he may sue OpenAI if it does not correct ChatGPT's false claims that he had served time in prison for bribery, in what would be the first defamation lawsuit against the automated text service," Reuters reported (fave.co/3GO24X2).

OpenAI's ChatGPT is catching the brunt of these lawsuits, possibly because it's at the

forefront of AI chatbots and was the fastest-adopted technology ever. (Spitting out libelous, hallucinated claims doesn't help.) But Microsoft and Google are causing just as much harm by associating chatbots with search engines. They're too inaccurate for that, at least at this stage.

Turley's and Hood's examples may be extreme, but if you spend any amount of time playing around with these chatbots, you're bound to stumble into more insidious inaccuracies, nonetheless stated with full confidence. Bing, for example, misgendered my daughter when I asked about her, and when I had it craft a personalized resume from my LinkedIn profile, it got a lot correct, but also hallucinated skills I don't have and invented previous employers out of whole cloth. That could be devastating to your job prospects if you aren't paying close attention. Again, Bard's reveal demonstration included *obvious* falsehoods about the James Webb space telescope that astronomers identified instantly. Using these supposedly search engine-adjacent tools for research could wreck your kid's school grades.

IT DIDN'T HAVE TO BE THIS WAY


The hallucinations these AI tools sometimes spit out aren't as painful in more creative endeavors. AI art generators *rock* (fave.co/40aXZTV), and Microsoft's killer-looking

Office AI enhancements (see page 25)—which can create full PowerPoint presentations out of reference documents you cite, and more—seem poised to bring radical improvements to desk drones like yours truly. But those tasks don't have the strict accuracy expectations that come with search engines.

It didn't have to be this way. The marketers at Microsoft and Google truly dropped the ball here by associating LLMs with search engines in the eyes of the public, and I hope it doesn't wind up permanently poisoning the well of perception. These are fantastic tools.

I'll end this piece with a tweet from Steven Sinofsky, who was replying to commentary (fave.co/3MjehAd) about severely wrong ChatGPT hallucinations causing headaches for an inaccurately cited researcher. Sinofsky is an investor who led Microsoft Office and Windows 7 to glory back in the day, so he knows what he's talking about.

"Imagine a world where this was called 'Creative Writer' and not 'Search' or 'Ask anything about the world,'" he said. "This is just a branding fiasco right now. Maybe in 10 years of progress, many more technology layers, and so on it will come to be search."

For now, however, AI chatbots are crypto bros. Have fun, bask in the possibilities these wondrous tools unlock, but don't take their information at face value. It's truthy, not trustworthy. 

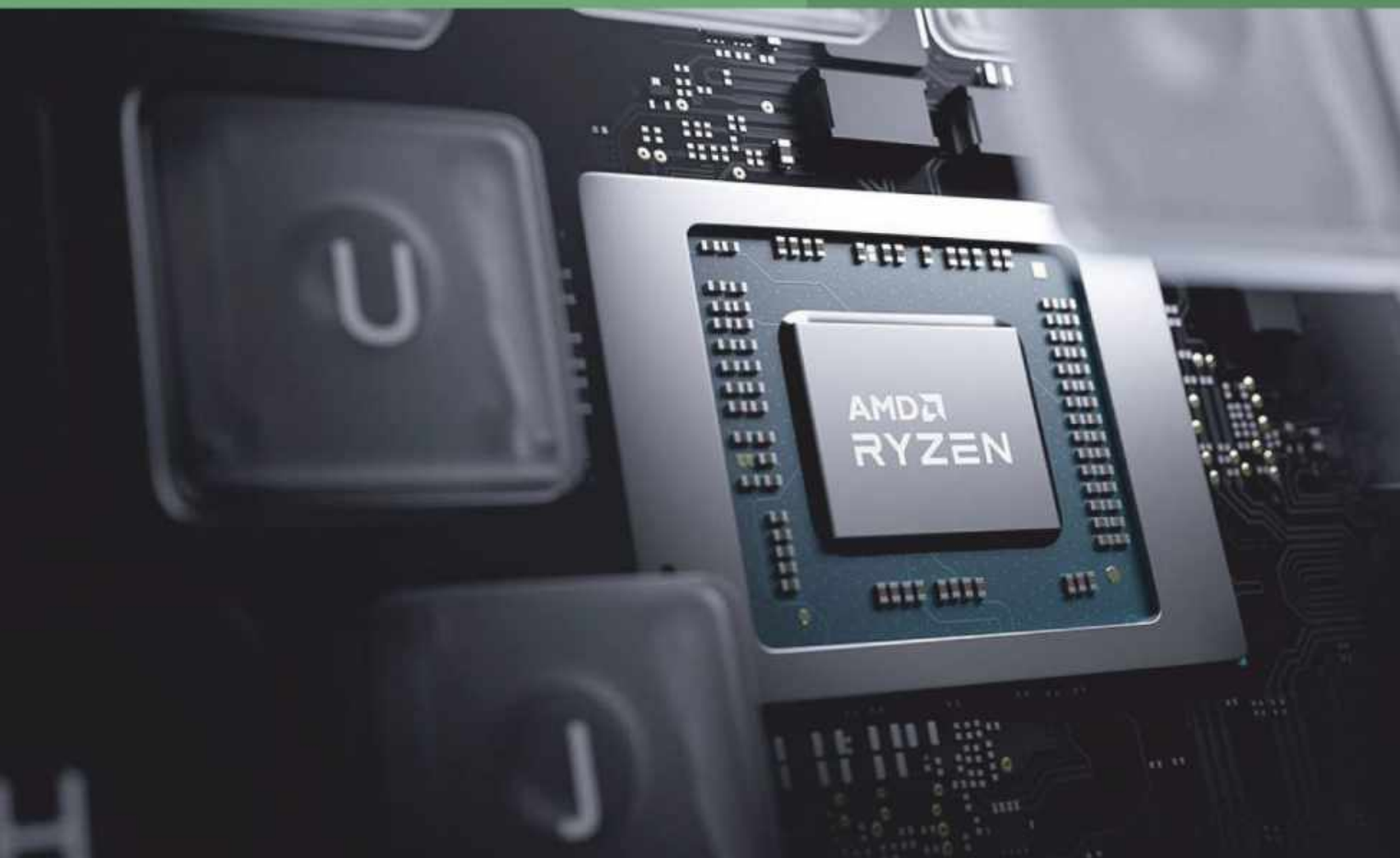
Help a lost pet get home

Posting a lost pet notice can reunite a family for a lifetime.



PetsAndPeopleTogether.org





Ryzen 7 7800X3D: 5 things you must know about AMD's gaming titan

This chip impresses even if you don't need one. **BY ALAINA YEE**

The AMD Ryzen 9 7950X3D's (fave.co/3YX4mJR) launch at the end of February made one thing abundantly clear: The first of Team Red's 7000-series 3D V-Cache processors were gaming monsters (fave.co/3Sg4p0a). Their extra additional layer of spicy L3 cache supercharged their performance.

But the chip everyone was waiting on—the Ryzen 7 7800X3D—was still a question mark. Held until its April 6 launch, the \$450 CPU is the “affordable” option compared to the \$699 7950X3D and \$599 Ryzen 9 7900X3D, and one that many gamers were eyeing with ready anticipation. We knew the 7800X3D's technical details (which you can

dig into via our YouTube coverage, fave.co/3A3vNHN), but how it would slot on to the leaderboards was a mystery.

Now with this chip on shelves, we finally know: Like its siblings, this processor is a beast. In fact it's the best CPU you can buy for gaming, if that's all you do.

Of course, there's more to this latest addition to the Ryzen 7000 lineup, as the benchmarks from all around the web show—and the info can heavily influence whether the 7800X3D is right for you. Here's what you need to know.

1. IN GAMES, IT SITS WITH INTEL'S AND AMD'S BEST CHIPS...

On site after site, the benchmarks show a similar outcome—the Ryzen 7 7800X3D punches way above its weight class in games. Whether it's Tom's Hardware (fave.co/43Ea6eX) or TechSpot (fave.co/3UWnck1), this processor's average performance in games puts it on the same footing as its much more expensive sibling, the 7950X3D. And that CPU edges past Intel's top chips, like the Core i9-13900K.

In fact, when looking at the aggregate scores, the 7800X3D sometimes displaces



The Ryzen 7 7800X3D can match the 7950X3D's top-tier performance in games—while costing \$250 less.

the 7950X3D from top spot. And for the reviews where it doesn't, you'll usually find it in second place. Meanwhile, Intel's \$418 Core i7-13700K—its closest rival in price—trails behind. Depending on the benchmarking suite (as reviewers don't have complete overlap in the games they test with), the 7800X3D can offer about 6 to 13 percent higher performance on average.

That said, the Ryzen 7 7800X3D doesn't always top the charts in every single game. In titles with better optimization for Intel processors, or ones more affected by clock speed than cache size, the 7800X3D falls to the middle or even toward the bottom of the pack of high-powered processors. If you fire up the same game every night (say,

Counter-Strike: Global Offensive) and expect top frame rates from your system, you should examine the relevant test results to make sure this processor is a good match.

2. ...BUT IT'S NOT AS GREAT IN OTHER TASKS

Throw games at the Ryzen 7 7800X3D, and it'll handle most of them with aplomb. Even when falling notably behind the top performers, it posts big frame rates. You'll notice the differences even less at higher resolutions and/or graphical settings that shift more work onto your graphics card (fave.co/3DOEuWk)—which can make its relatively more affordable price all the more alluring compared to other Ryzen 9 and 7 parts, as well as Intel Core i9 and i7 CPUs.

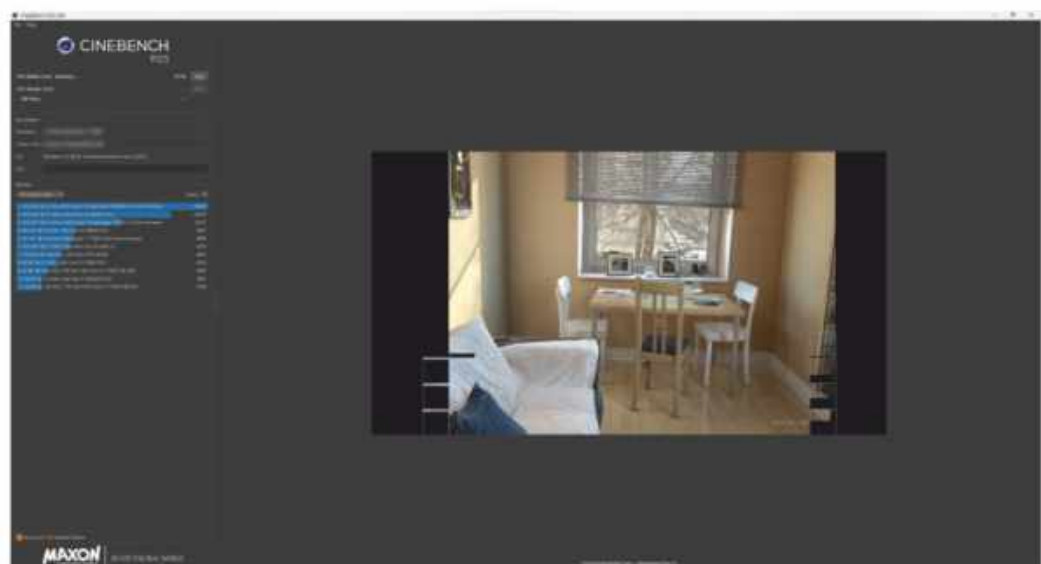
However, with others tasks, the Ryzen 7 7800X3D's results can't be contextualized in the same way.

Either a chip is faster in encoding and rendering, or it's not. And for anything heavily reliant on CPU speed or core count, the 7800X3D lags behind. You can see it for yourself in the Cinebench R23 multicore

results—compared to the 13700K, AMD's latest is 37% slower in TechSpot's review (fave.co/3odH8SV). Other outlets had similar findings.

This behavior tracks with what we saw in the first-generation 3D V-Cache CPU, the similarly fantastic Ryzen 7 5800X3D, fave.co/3D3nyxE (the 7800X3D's predecessor), as well as the 7950X3D when it launched. Neither of those chips could pull even with their X-variant siblings (5800X, 7950X) in content creation tasks.

But AMD's two higher-end Ryzen 7000 3D V-Cache processors can still rip through heavy production workloads—they're not incapable, just a little slower than the top CPUs in that regard. They're well suited for gamers who also want strong performance in all-core workloads, just not as much as someone whose main priority is work, not play.

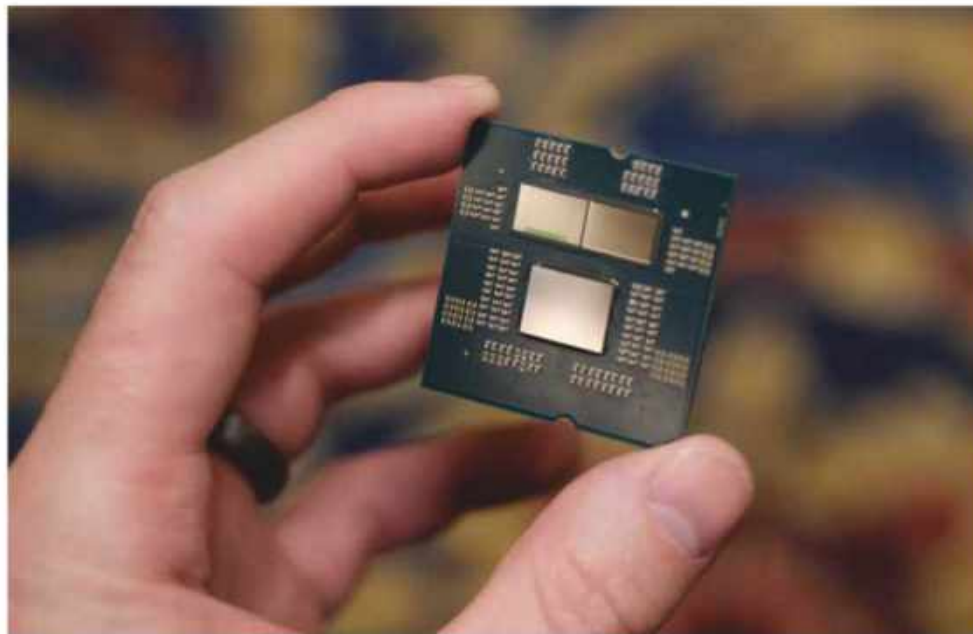


The 7800X3D can handle multithreaded workloads—but not nearly as well as powerhouses like the AMD Ryzen 9 7950X or Intel Core i9-13900K.

Meanwhile, the Ryzen 7 7800X3D is first and foremost a gaming CPU. If you need a processor with more even, balanced performance across the board, a rival like Intel's Core i7-13700K will be a more ideal choice. But if you're all in on gaming performance and you can wait longer for encoding to finish, this is your chip.

3. IT'S THE MOST POWER-EFFICIENT GAMING CHIP

In chart after chart measuring power consumption, the Ryzen 7 7800X3D drinks down electricity far more modestly than similarly priced processors—and it definitely consumes less than AMD's and Intel's standard flagship CPUs.



The 7950X3D and 7900X3D use two chiplets in their die, whereas the 7800X3D just has a single chiplet. In the dual-chiplet chips, one is geared toward faster clock speeds, and the other is layered with the extra L3 cache, a design that helps promote better performance across different workloads.

The exception, of course, are the other 3D V-Cache CPUs. These parts consume less energy due to lower voltages, which in turn lowers the amount of heat produced—a necessary design choice to mitigate the thermal consequences of having more L3 cache stacked on.

So on occasion, you can see a benchmark result where the 7950X3D noses past the humbler Ryzen 7 7800X3D. But overall, the 7800X3D hits a utility bill far more softly than the 7950X and 13900K, which take no prisoners and make no apologies for gobbling down watts. Its weaker production performance can be traced directly to how much energy it uses. Just have a peek at TechSpot's examination of electricity used

(fave.co/41tN3IP)

while running a Blender rendering test. The 13700K is 44 percent faster, but it also consumes 89 percent more power.

In games, the gap isn't quite so wide, but it's still notable—you'll see differences between 20 and 28 percent in power consumption compared to chips like the 13700K and 13900K, often while

the Ryzen 7 7800X3D is outperforming them. And as you might guess, using less energy translates not only to bigger savings on your utility bill, but to less heat to dissipate. TechSpot never saw the 7800X3D rise above 84 degrees Celsius (fave.co/3UIMy4D) during all-core workloads in Cinebench R23, or 66 degrees during the program's single-core test.

4. YOU SHOULDN'T BUY THIS INSTEAD OF A MORE POWERFUL GPU

The Ryzen 7 7800X3D is a ferocious chip, but you won't benefit if it's the most powerful component in your build. Unlike with a processor that can also tear through production work, its main purpose is to keep your gaming rig firing on all cylinders.

And in a gaming rig, you'll be best served by skewing your budget more toward your GPU rather than your CPU. You don't want your processor to bottleneck your graphics card, of course, but if your CPU is more powerful than the GPU, you're not making the most of your build.

Given how far the Ryzen 7 7800X3D can stretch its legs,



The 7800X3D goes easier on power consumption while still posting impressive benchmark results.

it can comfortably partner the best video cards on the market, such as the Nvidia GeForce RTX 4090 or AMD Radeon RX 7900 XT. It's the best gaming CPU for high-end yet still price-conscious



Despite its smaller price tag (compared to flagship CPUs), the 7800X3D pairs well with top-of-the-line GPUs for games due to its superb performance.

shoppers—when you want the absolute best for the wide variety of games you play, without overspending on performance for heavily threaded or clock-speed-sensitive workloads you'll never run.

So if you're deciding between an RTX 3060 (fave.co/3IUcqKX) and an RTX 3070 (fave.co/3mCGRIO) or Radeon RX 6800 XT (fave.co/3A1WxIT), the better graphics card and a cheaper (say, \$300) CPU will give you better bang for your gaming buck. That doesn't make the 7800X3D a bad choice—rather, it's best suited for high-end

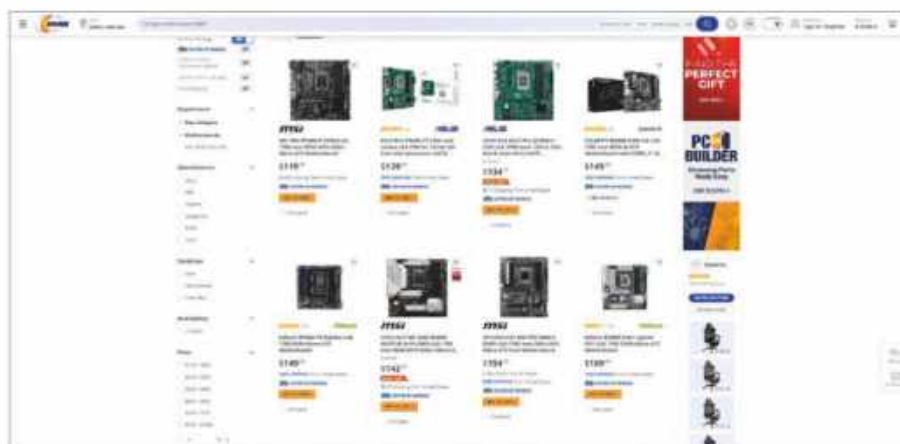
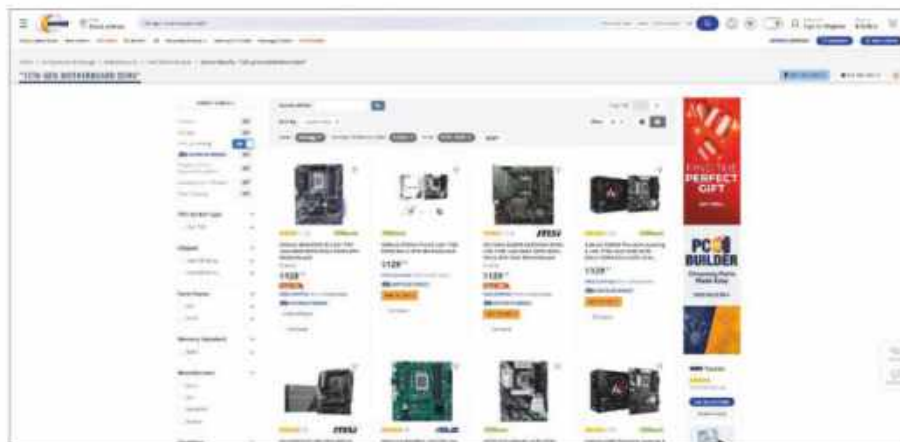
gaming rigs where the CPU could be a potential choke point.

5. INTEL STILL HOLDS THE LEAD ON VALUE

Would-be buyers of Ryzen 7000 CPUs got welcome news this week—the launch of a budget A620 chipset (fave.co/3odw2xj) for AM5 motherboards. But even if you were to scrape that low to save a few bucks (perhaps to afford the 7800X3D, however ill advised a choice), the reality is that you still can't beat the savings you can get with an Intel chip—

not if you're willing to drop down to slower (and cheaper) memory.

AM5 motherboards—the sole motherboards compatible with Ryzen 7000 (fave.co/40dU7Bm)—support DDR5 memory only. Prices have come down for this faster RAM, but they haven't bottomed out to match DDR4 memory pricing yet. Meanwhile, DDR4 motherboards exist for Intel chips, and they're cheaper than DDR5 motherboards. So you'll save on both the motherboard and the memory with Intel. 🔌



The \$125-plus DDR4 motherboard options for Intel 13th-gen parts (top) versus the equivalent assortment of DDR5 mobo options (bottom).

The best AI art generators: Bring your wildest dreams to life

It's easier than ever to try out AI art for yourself, with a number of low-cost or free AI art generators. **BY MARK HACHMAN**



Al art generators have moved from novelty to niche to even a commodity in just months, with numerous services promising the ability to create generative AI art instantly using natural-language text

prompts. The very best AI art services offer superb imagery and superior tools, either for free or for a low price.

Why use AI art? Many of us can appreciate a great painting, photograph, or drawing without having the ability to create it

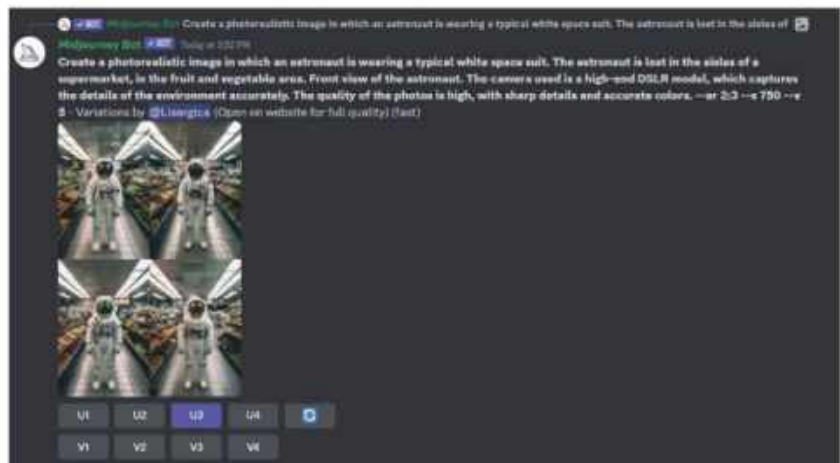
ourselves. We may also be able to describe what we want to see, and that's where AI art comes in (fave.co/3YnSzFq). Instead of searching for a piece of art that matches that description, the service actually generates it, matching what it knows of the scenes depicted in its image database and comparing them to the scene and style you specify.

All that complexity, however, demands intensive computing resources. AI art services tend to handle this in two ways: either limiting the generated images (the number of images or their resolution) or charging you "credits" or actual money to enable further subscriptions. We factor that in.

Finally, we can't ignore the legal and moral implications of AI art. Generative AI art was trained on a vast number of images—some public, some possibly private—and the services use that as a "seed" for the images they produce. Not all AI services are transparent about the source of their images. Companies like Getty Images feel that this is illegal and have filed suit (fave.co/3FDqFgz). The actual originality of AI art is in dispute, however, and AI proponents note that even human artists are typically trained or influenced by

their exposure to existing art, whether public or private. Just know that you probably won't "own" a piece of AI art without providing some evidence that you yourself have altered it to make it an original work.

Confused? We'll talk more about how to get started with AI art and some of the specifics of AI art terminology you might like to know (inpainting, for example) at the end of this story.



Midjourney's UI is actually on Discord, where users can enter public prompts and see the images others generate. We've zoomed in on a screenshot taken from Discord, showing the final photorealistic result.

THE BEST AI ART GENERATORS

Midjourney

Cost: Free trial (on hold)
/\$10/\$30/\$60 per month

Images: 25 prompts for the free trial, then it varies

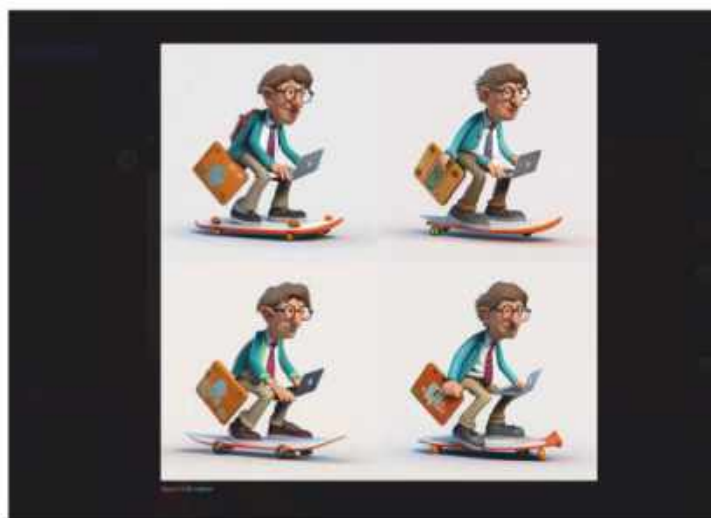
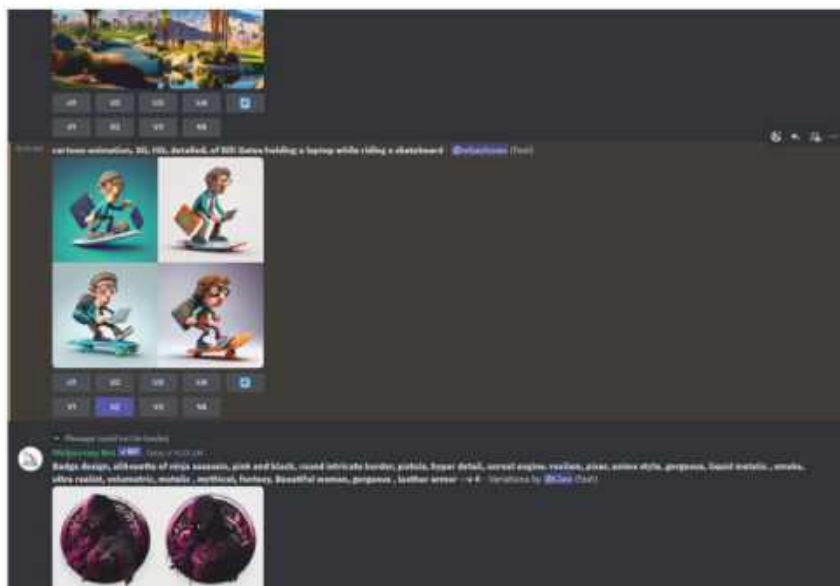
Image license:

Noncommercial use for the free trial, otherwise commercial use permitted except for large businesses

NSFW/Celebs: No/Yes

So far, Midjourney (fave.co/43FBJo8) stands out as the unparalleled leader of AI art since its launch last year (fave.co/3QWOeFQ)—though the magnificence of its images contrasts rather ironically with the absolute clunkiness of its interface. Midjourney 5 (the current version as of press time) delivers the sort of hyperrealistic, fake images (the Pope in a puffy jacket, say: fave.co/3oj9paQ) that generate news stories. “Reality” can now be artificially generated.

Midjourney uses Discord as its interface because the startup didn’t want to invest in any infrastructure. You’ll need to sign up for that app, then drop into one of the “newbie” Discord channels and use the **/imagine** command to prompt the service with your request for AI art. (Here’s a guide to getting started with Discord [fave.co/3A4TNKx] if you need it.) Midjourney charges

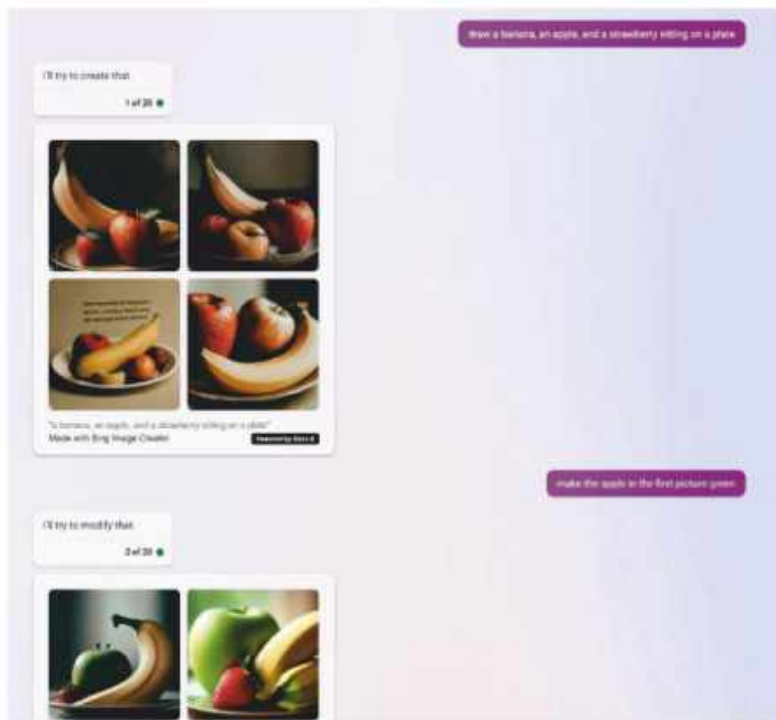


Each of the four Midjourney images can either be upscaled or you can ask for variations on them, as shown here.

at least \$10 per month for its basic plan, with additional tiers for \$30 a month and \$60 a month. Midjourney put a free trial on hold (fave.co/3oj9paQ). There are ways to buy more à la carte time, to use a slower “relaxed” mode, and more.

Each prompt generates four images, any of which can be chosen for “variation,” as well

as upscaling. Inpainting is also possible. You can open the image in either Discord or a browser to download it. Midjourney says you can use its generated images “in just about any way you want,” which includes ownership of those images, subject to its terms of service.



Let's reiterate: Midjourney images are magnificent, and, since they're public, you can see other users generate images in real time as well as browse a gallery of historical images. The magic of Midjourney is how it typically delivers a good image routinely. But using it is a lot like a command-line version of Photoshop: There are tons of available tweaks, and they're not obvious at all.

Microsoft Bing Chat (Creative Mode)

Cost: Free with Microsoft account

Images: Apparently unlimited

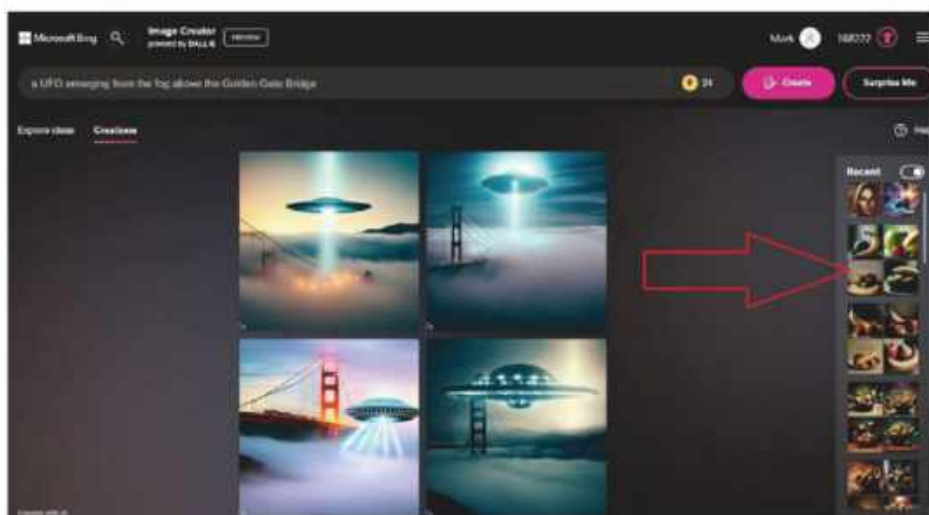
Image license: Unclear

NSFW/Celebs: No/Some

Normally, we'd highlight Bing Image Creator (fave.co/43xylGk) as Microsoft's AI image contribution. The AI-powered Microsoft Designer

(fave.co/3HkIEJ5), too, is excellent. But weirdly, we like Bing Chat (fave.co/3HcuppCf), specifically its Creative Mode, as a top AI art generator for one specific reason: iterations.

All three of Microsoft's AI art services are essentially free and apparently unlimited, provided that you have a

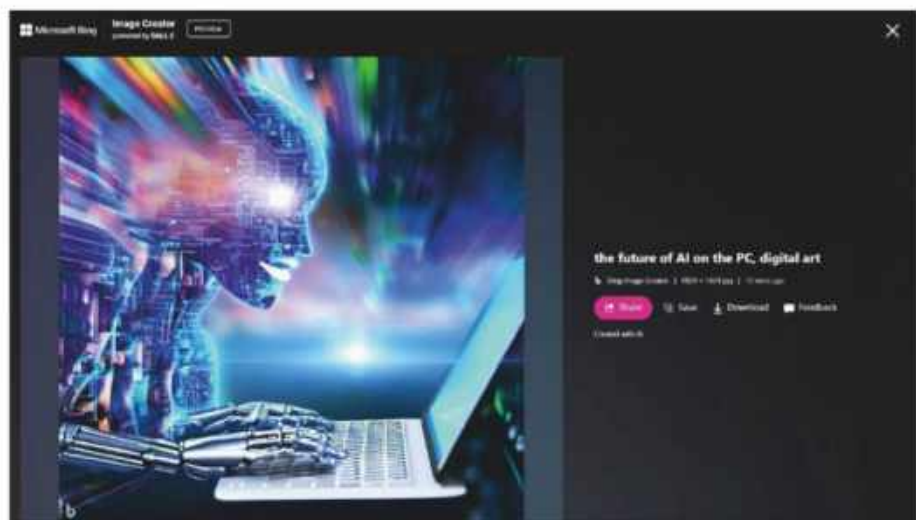
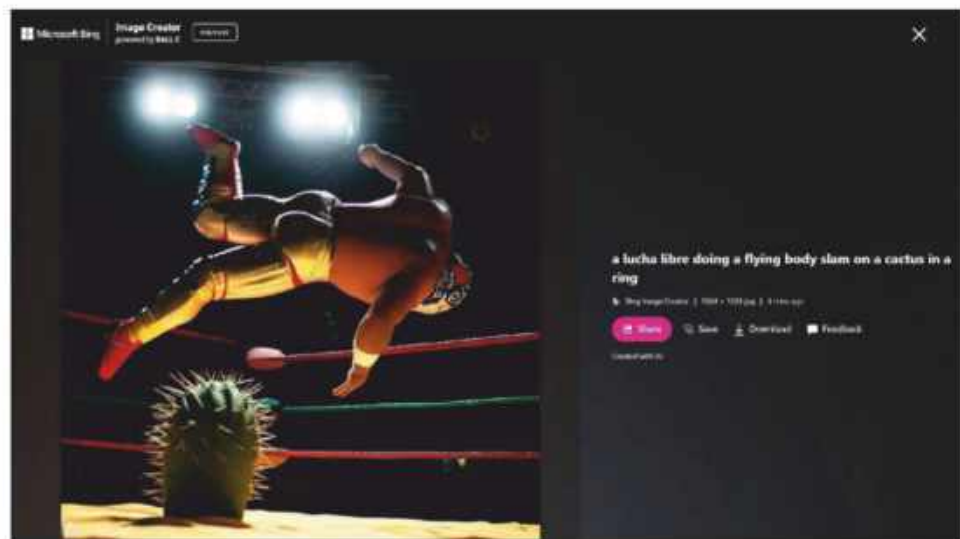


You can ask for AI art within Bing Chat, but the images will be stored in Bing Image Creator.

Microsoft account and managed to get through the waitlist for Bing Chat and Image Creator. (Image Creator has an odd “boost” system, which may or may not be in play here, but Microsoft doesn’t seem to flag any limits on the number of images you can generate, which is a huge selling point.) Microsoft doesn’t claim to own any of the images it generates, but it doesn’t say that you own them, either.

Otherwise, all you need to do is go to Bing Chat and enter a prompt like “draw me a...” followed by a description of the image you want. Bing will take a few moments and generate four 1,024×1,024 images that you can click on to see more clearly and download them. Bing won’t draw celebrities like Bill Gates or Donald Trump, but Brad Pitt is just fine, apparently.

Microsoft uses a trained version of the DALL-E 2 model, and the results are, subjectively, just a step below Midjourney’s. Though Bing Chat doesn’t seem to allow inpainting, it lets you do something that not



Some example images created in Microsoft Bing Image Creator.

all other AI art generators do: incrementally iterate on a scene. By that, we mean that we could prompt it to “draw a basket of fruit” and then, in the next prompt, ask it to adjust a detail of the scene. (It won’t edit the scene, however—it just downloads another image.)

What Bing Chat doesn’t seem to do itself is archive images. You’ll need to promptly (heh) download them or visit Bing Image Creator, where you’ll find them hidden.

Playground AI

Cost: Free/\$15 per month

Images: 1,000 per day (free)/2,000 per day (paid)

Image license: You own them, even for commercial use

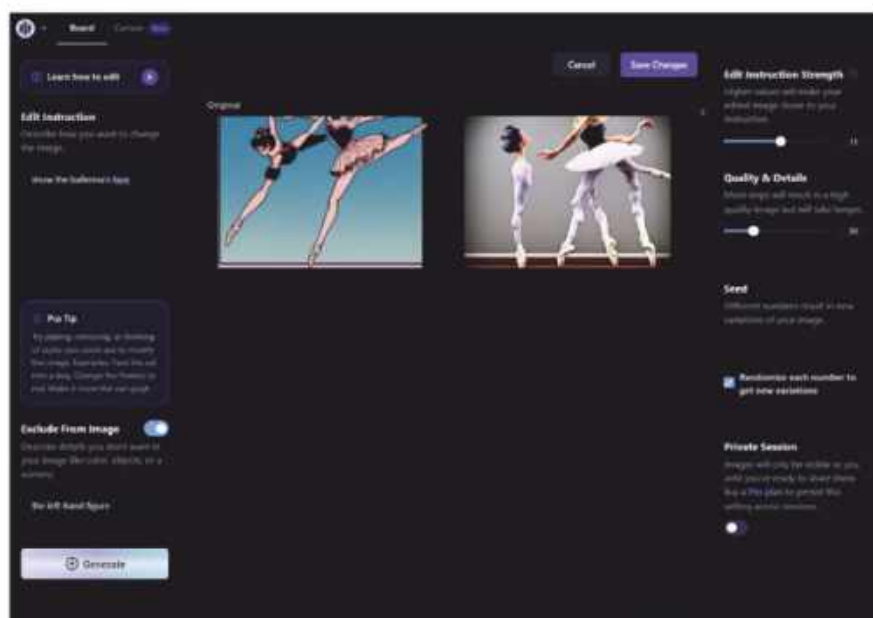
NSFW/Celebs: No/Yes

Though Microsoft Bing Chat probably

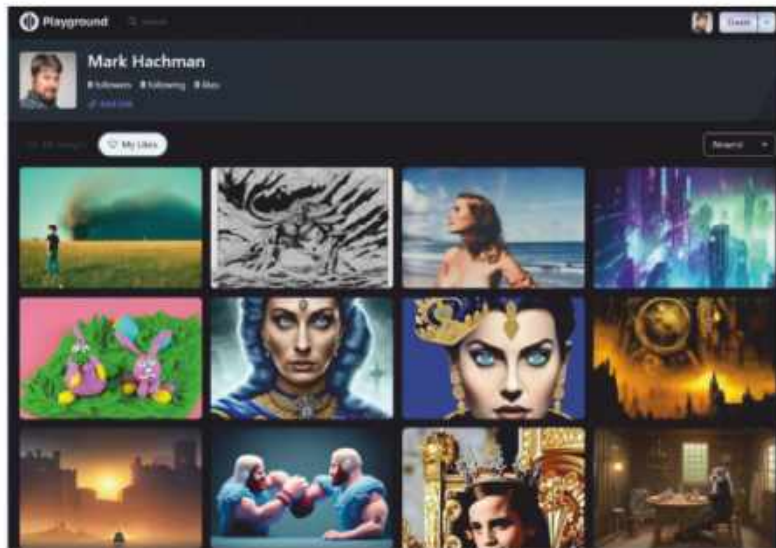
wins out in terms of its absolute simplicity, Playground AI (fave.co/41veJGm) is probably the cheapest, simplest, yet most comprehensive way to sample AI art for yourself. With nothing more than a Google account, you can sign up for Playground and its 1,000 free images per day. (Some quality and size details are limited after 50 daily images.)

Playground's UI is very well designed, with prompt information and styles on the left rail, and adjustable sizing, weighting, and other tweaks to the right. The generated images aren't quite as good as those of Bing or Midjourney, but it's a very small step down. About the only limitation are the available models: just Stable Diffusion 1.5 and 2.1, which will suffice for many people. (Access to DALL-E 2 costs an extra \$10 a month.) You can play around with celebrity images if that's your thing, but NSFW images are a no-no.

Where Playground shines, though, is in editing. Like Bing, you can edit created images through additional prompts, whether it be the whole thing or just a portion



Playground AI provides a very nicely designed UI for AI art generation, but its AI editing features may need some tweaking. One of its strengths, though, is in outpainting, which we describe in the glossary at the end of this story.



Some example images created with Playground AI.

(inpainting). Playground calls this the Canvas, and it's a beta feature that needs some work—the transition from creation to editing (via prompt) to editing (via inpainting and outpainting) is rougher than it needs to be. Otherwise, this service really delivers.

Adobe Firefly

Cost: TBD

Images: Unlimited, at least in beta

Image license: Noncommercial usage only while in beta

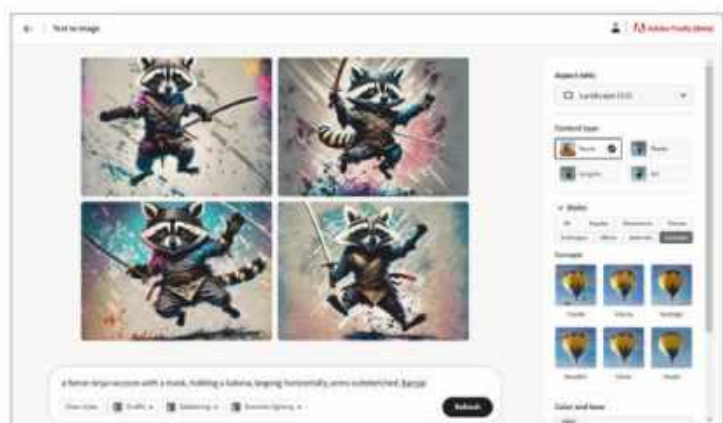
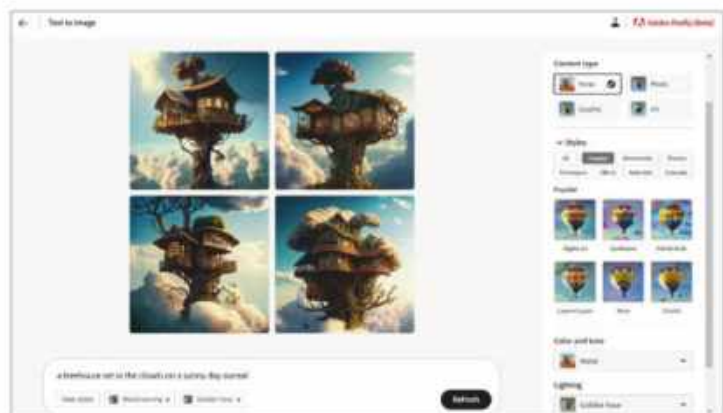
NSFW/Celebs: No/No

Adobe is a major player in creative design, so it makes sense that all of its tools incorporate AI to some extent. Adobe Firefly (fave.co/3GORlvG) represents Adobe's first public steps in that direction. Currently in beta, Firefly is built upon copyright-free or openly

licensed images, or images it itself has owned. Maybe for that reason, Firefly images look professional—a self-fulfilling cycle, maybe, given that you've probably seen many images originally created from Adobe tools and Adobe stock.

Right now, we don't know what Adobe will eventually charge for Firefly, or whether it will be a standalone product. We'd expect the Firefly engine, at least, to land in Photoshop and Adobe's other tools.

The beta currently offers an unlimited amount of text-to-image generative art as well text



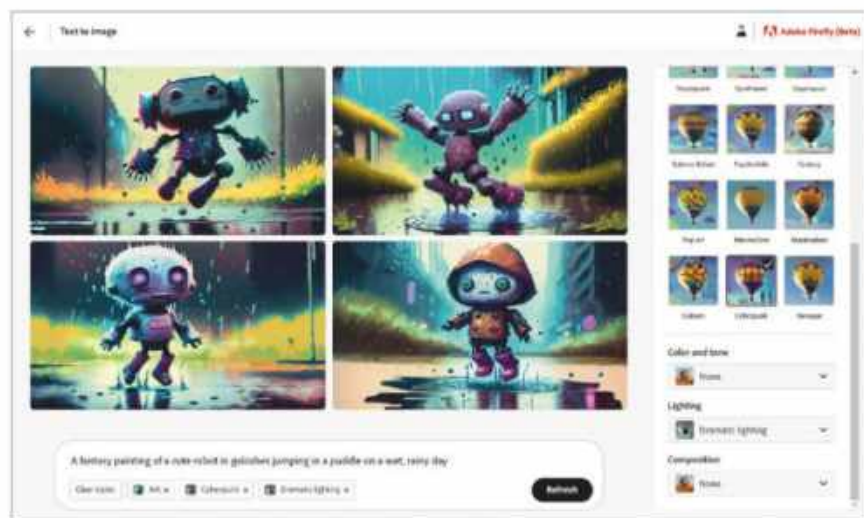
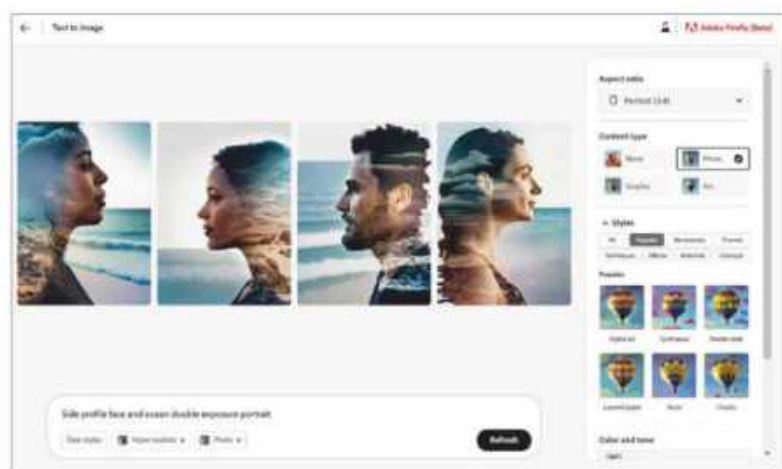
Examples of Adobe Firefly AI art.

effects, or AI-generated textures applied to text via a prompt. Adobe also says that it's "exploring" inpainting, outpainting, turning 3D models into images, personalized AI models, sketch-to-image, and more.

Adobe's model doesn't seem as creatively free as some others but makes up for it with its slick, professional look. Each prompt generates four images, which you can adjust with easy-to-parse stylistic adjustments from content type (photo, graphic, art) to styles (layered paper, fur, neon, palette knife) to

color, tone, and lighting. Adjusting the image format changes the image, too. Just forget anything NSFW or with celebrities inside of it.

Adobe Firefly seems to do best with images that have some connection to the real world and its stock imagery. Odd connections ("a fly buzzing around a king's head") produce stunning visions of just one portion of the scene. Pros will love Firefly, which will undoubtedly be locked behind an expensive Creative Cloud subscription.



Adobe Firefly double exposure.

Stable Diffusion

Cost: Free

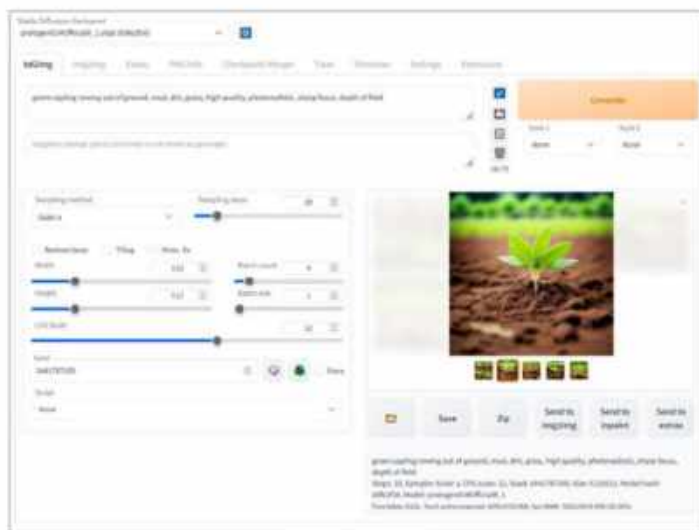
Images: Unlimited

Image license: Unclear

NSFW/Celebs: Yes/Yes

Unlike with cloud-based AI art services, a key selling point of Stable Diffusion is that it runs locally, on your PC—not on a server! If you want to create dozens of images of bikini-

clad elves frolicking in pools of jello on Midjourney, the world is going to be able to see them. Otherwise, if you have a powerful gaming laptop (fave.co/3n3aNKv) or desktop, you can download the Stable Diffusion code and a variety of image models and training data and go to town in the privacy of your PC. And it's all free, provided that you have



The Automatic1111 UI.

the time to download a multi-gigabyte software model, the hardware resources to run it, and the patience to set it all up.

Stable Diffusion can be a bit like running Linux. Its legacy is the command line, and there's just a ton of publicly available code on GitHub and so on to play with, if that's your thing. However, UI-driven implementations of Stable Diffusion are becoming more common,

and the most popular at the moment seems to be AUTOMATIC1111 (fave.co/3UjcA7Z).

Naturally, the more powerful your hardware, the better—but it's not only your CPU or even your GPU that matters. Instead, the key component seems to be your GPU's available VRAM. There are models and toggles and other options to tweak Stable Diffusion in favor of your CPU or lower-tier GPUs, but the easiest way to run Stable Diffusion is with a powerful PC.

Stable Horde (Artbot)

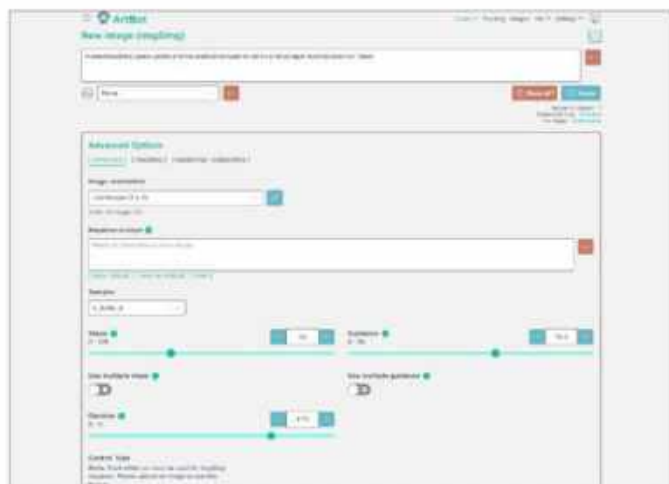
Cost: Free

Images: Unlimited, though they are subject to queuing

Image license: Unclear

NSFW/Celebs: Yes/Yes

So what happens if you don't have a powerful enough PC to run Stable Diffusion? Stable Horde is one answer. Like the old-school (now defunct) SETI@Home, all you're



One of the best things about Stable Diffusion is its AI art models, though they can often be hit or miss.



A collection of images generated with Artbot.

doing is sending your prompt out to a cluster of connected PCs running Stable Diffusion. There are a few front-end interfaces, but we rely on Artbot (fave.co/3mMgSyB).

Unlike Stable Diffusion, Artbot uses a GUI that's somewhat navigable: a prompt at the top, followed by a ton of available options and models. What Artbot offers are helpful tooltips that explain what those options do: how weighting the prompt affects it, negative prompting, and more. There's an extremely helpful list of the various models you can use as a framework for your prompt, showing you visually how they'll affect the style of the output. The configurability is amazing.

Stable Horde isn't really free, however. It works on a "kudos" system, where you'll need to sign up with an API key—a hurdle for users unfamiliar with the concept. After that, you'll start with a balance of kudos, which are subtracted with each image you generate.

The more complex the image is, the more kudos it consumes. The fewer the kudos, the further back in the queue you'll end up with other users. That's not always a problem—with 30 or so PCs all working together to churn out images, you may find that your image is generated immediately. (Images are saved in a library on the site until you clear your cookies.)

You can "buy" kudos, however, by rating images, training the model on which images humans (you) prefer, or connecting your PC to the Horde itself. While you can go into "debt" by frequently generating images, there are certain actions you can't take without an actual kudos "balance" to fund it.

Why use Artbot? The vast number of AI models it offers and the variance in style those images produce. Otherwise, generating images via Artbot can be a bit of a crapshoot, and you may expend a great number of kudos simply exploring all the options. Since there's no real setup besides figuring out the API key, Stable Horde (Artbot) can be worth a try.

RUNNERS-UP: DALL-E, MAGE.SPACE, GETIMG.AI AND DREAMSTUDIO AI

Four AI art services stand out but don't make our list: OpenAI's own Dall-E ([fave](https://fave.co/3mMgSyB)).

[co/3An9L37](https://fave.co/3An9L37)), Mage.Space, DreamStudio, and Getimg.ai.

We wrote about DALL-E recently (fave.co/3A6G85G), and some of the photo-like art generations are excellent. It just feels like OpenAI isn't too serious about it, though, and the pricing model (115 images for \$15) doesn't make sense. Bing Chat's free images are trained on DALL-E, too.

Mage.Space (fave.co/3GKIXhR) had a reputation for a very NSFW-like atmosphere, but the site phased all of that out recently. It has, however, left what it refers to as an absolutely unlimited amount of images, for free. (NSFW generations cost \$4 per month, in part because credit cards can be a form of identification.) The site has what appears to be over 40 very nice tuned generation models, but those are reserved for the \$15 per month Pro plan.

Getimg.ai (fave.co/3mGq9lC) also offers an excellent variety of models with which to generate images, prompt-based editing, and even DreamBooth, which allows you to train a model on your own photos. Getimg.ai also implements ControlNet for image-to-image generation, an algorithm that specifically preserves characteristics of the original image (such as a pose) in image-to-image generation. A limit of 100 free images per month feels a trifle skimpy, however, though a



A collection of images made with DALL-E.

\$12 per month subscription earns you 3,000 images per month, upscaling, and access to the imaging models.

I've spent a lot of time with DreamStudio AI (fave.co/3mGqmvo), which provided credits for us to try, but it just feels too limited (and still a beta?) right now. A flat fee of \$10 buys you enough credits for 5,000 images, but there are only a handful of models, there's no editing, and the images don't stand out.

For various reasons we ruled out Deep Dream Generator, Starry.ai, NightCafe, and Craiyon, which has devolved into a sea of advertisements.

HOW TO GET STARTED WITH AI ART: THE BASICS

If you're interested in trying out AI art, remember that there are plenty of sites that will let you try out AI art for free—and you should. A Google account seems to be the

default requirement, however, as many don't even offer the ability to choose a username and password.

Few AI art generations will look perfect on the first try. What sites like Midjourney do is help new users get started. You can obtain a great result with just a very basic description.

But, like any hobby, AI art has its own nerds. Some sites will refer to (and even offer tutorials on) "prompt engineering," or tailoring your text prompt to get the result just so. What other sites offer as an alternative is a simple visual list of styles and models that you can choose from—and selecting those will add the proper text to the prompt itself. (It can be useful to understand just how synthwave differs from cyberpunk!) Some, unfortunately, lock these additional models behind a paywall.

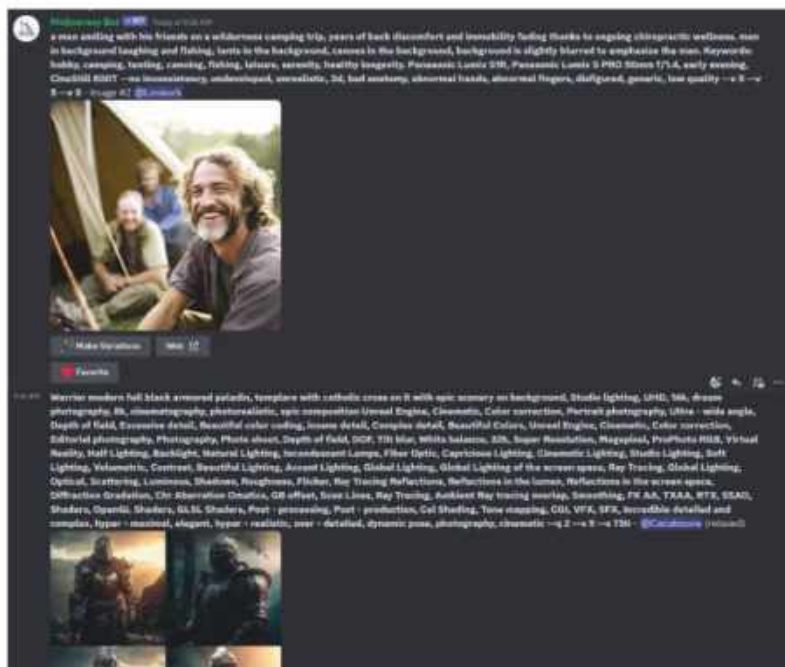
If you're suddenly at a loss for what to create, think of tweaks to the real world: a dragon perched on the Brooklyn Bridge. The cute centaur at the end of the bar. You'll have even more fun with casting scenes in the styles of your favorite artists or photographers. Words matter, as does phrasing! Sometimes a phrase like "while skateboarding" may be misinterpreted, but "riding a skateboard" might not be.

You can often generate more than one image at a time, though it

will often cost you in terms of credits or whatever the site uses to limit generations. Larger images will often require more credits, but this varies by service.

Think of a prompt in this way: "a photo/comic/woodcut of a squirrel/Marilyn Monroe/a fairy in the style of Van Gogh/Ansel Adams/Salvador Dali," where you choose one of each. Then add whatever modifiers you can think of: Is the scene viewed through the branches of a tree? Shot with a Canon DSLR with a long lens? AI can accommodate more than you'd think.

Well, almost everything. AI art also has one weakness: hands and fingers. Why? We're not sure, but it's such a common weakness that it's almost a meme! Some



You can simply write a prompt like "man sitting next to tent" and you'll receive a result from an AI art service. But some people prefer to get very, very specific.

terms of service also allow NSFW images, while others don't—when you think about all of the awful things that people can imagine, this makes sense. Others don't care about allowing celebrity likenesses, such as former presidents.

Just as someone skilled in Photoshop or Lightroom can need time to edit a photo, so can you. You may need a few dozen efforts to get things just so—and that's why it's worth trying AI art on a site that allows multiple prompts for cheap, to see if it's worth it. Try multiple sites, too! Additional editing tools like inpainting and outpainting can help fix errors.

Yes, inpainting. Don't know what that means? Neither did many of us until fairly recently. We've included a glossary below to provide additional AI art definitions.

Prompt: A simple (or complex!) text description that describes that the image portrays. This is affected by the prompt weight (see below).

txt2img (text-to-image): This is basically what we think of in terms of AI art: Input a text prompt, generate an image.

Negative prompt: Anything you don't want to see in the final image.

img2img: (image to image): Instead of generating a scene from scratch, you can upload an image and use that as inspiration for the output image. Want to turn your dog into a king? Upload the dog's photo, then apply the AI art generation to the scene.

Model: AI uses different generative models (Stable Diffusion 1.5 or 2.1 are the most common, though there are many others like DALL-E 2 and Midjourney's custom model) and each model will bring its own "look" to a scene. Experiment and see what works!

Prompt weight: How closely the model and image adheres to the prompt. This is one variable you may want to tweak on the sites that allow it. Simply put, a strong prompt weight won't allow for much creativity by the AI algorithm, while a weak weight will.

Sampler: This is nothing you probably need to worry about, though different samplers also affect the look of an image.

Steps: How many iterations an AI art generator will take to construct an image, generally improving the output. While many services will allow you to adjust this, a general rule of thumb is that anything over 50 steps offers diminishing improvements. One user uploaded a visual comparison of how steps and samples affect the resulting image (fave.co/41t3YEg).

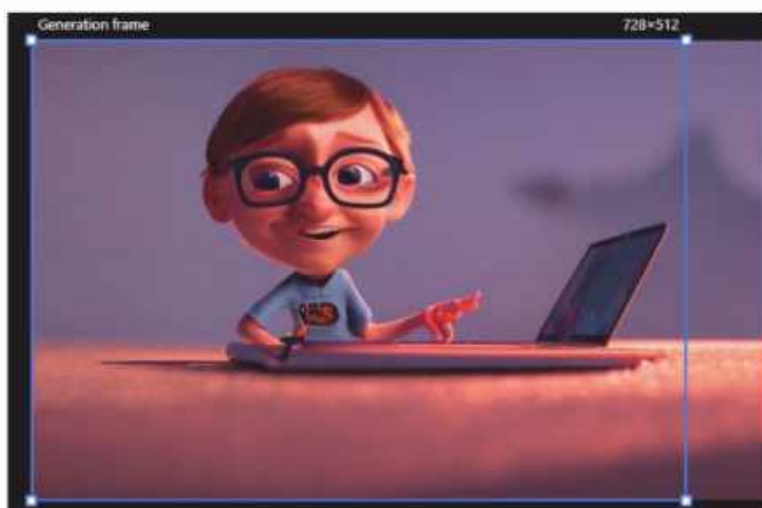
Face fixing: Some sites offer the ability to "fix" faces using algorithms like GFPGAN, which can make portraits look more lifelike.

ControlNet: A new algorithm, not widely used. ControlNet is specifically designed for image-to-image generation, "locking" aspects of the original image so they can't be changed. If you have an image of a black cat and want to change it to a calico, ControlNet could be used to preserve the original pose,

simply changing the color.

Upscaling: Default images are usually small, square, 1,024×1,024 images, though not always. Though upscaling often “costs” more in terms of time and computing resources, upscaling the image is one way to get a “big” image that you can use for other purposes besides just showing off to your friends on social media.

Inpainting: This is a rather interesting



AI cut off the image to the left for some reason, leaving the result with half a face. Outpainting uses AI to extrapolate what the rest of the scene should look like.

form of image editing. Inpainting is basically like Photoshop plus AI: You can take an image and highlight a specific area, and then alter that area using AI. (You can also edit everything but the highlighted area, alternatively.)

Imagine uploading a photo of your father, “inpainting” the area where his hair is, and then adding a crown or a clown’s wig with AI.

Outpainting: This uses AI to expand the boundaries of the scene. Imagine that you just have a small photo, shot on a beach in Italy. You could use outpainting to “expand” the shot, adding more of the (AI-generated) beach, and also perhaps a few birds or a distant building. It’s not something you’d normally think of!

AI art can be scary to a generation of artists who may now have to, perhaps unfairly, compete with machine-generated AI art. (Imagine what it’s like for a writer to test AI chatbots like ChatGPT, Bing, and Google Bard; see page 9.)

However, we choose to look at AI art as its own, unique, creative outlet, encouraging you to think about and create your own pieces. After all, you can buy food at a restaurant, or you can follow a recipe and combine ingredients yourself. Each has its place. Encouraging more people to become part of the creative process is what AI art is all about. 🔌



HP Dragonfly Pro review: You better watch your back, Apple

Apple's got some serious competition. **BY BRENDAN NYSTEDT**

We've all been there—chilling at the local café, minding our own business, when some hip remote worker comes in with a MacBook Pro and starts working away. No judgment from me—I use Macs, Windows PCs, and Linux devices on the regular.

But since Apple went with its own custom processors, those machines have proven hard for the PC industry to match. Not only are the latest MacBooks attractive, they boast surprising power and incredible efficiency, too.

That's why HP partnered with AMD to create the new HP Dragonfly Pro. This slim

laptop packs the latest Ryzen processor, with 8 high-performance cores and powerful graphics, to take on the Mac. While you'll need to decide for yourself if you'd rather have this over a MacBook, we found that this is a computer worth considering.

SPECS AND FEATURES

Our review unit came with the following specifications and features:

CPU: AMD Ryzen 7 7736U (8 core, 16 threads)

Memory: 16 GB LPDDR5 6400 MHz RAM soldered (up to 32 GB available at purchase)

Graphics/GPU: AMD Radeon 680M (12 graphics cores)

Display: 14-inch 1920×1200 16:10 IPS touchscreen, 400 nits

Storage: 512 GB PCIe NVMe solid state drive (soldered)

Webcam: 5MP IR camera

Connectivity: 2x USB 4 Type-C (40 Gbps, Thunderbolt 3 compatible), 1x USB-C 3.2 10 Gbps

Networking: Qualcomm WCN685x with Wi-Fi 6E, Bluetooth 5.2

Biometrics: Windows Hello facial recognition and fingerprint reader

Battery capacity: 86Wh

Dimensions: 12.4 W×8.7 L×0.7 H inches

Weight: 3.33 pounds, 3.95 pounds with AC adapter

Price as Reviewed: \$1,399

DESIGN AND BUILD QUALITY

If HP was targeting Apple's quality, I've got to hand it to them—the Dragonfly Pro gets close by most measures. This thin laptop feels high quality from the moment you tear off its recycled paper covering. Although you don't get a lot in the box, you get a high-powered 96-watt power brick and a braided USB-C charging cable. The power brick and laptop both sport the sleek, angular HP logo, which sets them apart from lower-end laptops offered by the company.

The laptop on its own has a nice shape, with high-quality materials like polycarbonate and aluminum used in its construction, some of which are



If HP was targeting Apple's quality, the Dragonfly Pro gets close by most measures.

post-consumer recycled. The black color I sampled has a slight fleck to its color, lending it a spacy sheen in the right light. That said, it's not glossy and the only portions that picked up any fingerprints were on the keycaps and the glass touchpad surface.



You'll find two Thunderbolt 4 sockets on the left side of the computer.

Underneath, you'll find a pair of raised rubber strips that slightly raises the angle of the keyboard while giving the cooling vent ample access to air. And when the system is under load, it'll need all the air it can get, as the fans spin up and can be easily heard, albeit with a consistent whoosh and not an annoying whine.

CONNECTIVITY

Like Apple, HP has taken a minimalist approach to ports. If you do most of your work online and rely on cloud storage, you won't be too annoyed, but those of us who plug in a bunch of accessories and still use corded headphones may have a tougher time.

The Dragonfly Pro at least gives you the opportunity to add ports thanks to its set of two USB 4 ports. These are compatible with the Thunderbolt 3 standard, and will let you attach high-speed storage (up to 40Gbps), docks, and fast chargers. These two ports are on the left side of the computer, with a small

LED letting you know if the laptop is still taking in power from the charger.

On the right side is a single plain old USB-C 3 port with significantly lower bandwidth. With only 10Gbps transfer speeds, I'd say this is more useful for slow accessories or as a dedicated charging port. If I'm going to gripe about the connectivity here, it's that even Apple has a headphone jack on its mainstream Mac laptops. That omission is frustrating, to say the least. The other thing I can't understand is why the third port has such downgraded throughput. Whenever Apple gives users more than two ports, it tends to give them a similar baseline of performance. Here, you'll have to pick and choose ports based on their speed.

Wireless is what I'd expect from a 2023 premium PC, thanks to a chipset from Qualcomm. What you get is the latest Wi-Fi 6E technology, along with Bluetooth 5.2 for your headphones and other wireless peripherals.

KEYBOARD AND TRACKPAD

Like the HP Dragonfly G3 Folio I tried recently, the Dragonfly Pro provides a top-notch on-the-go typing and mousing experience. The keyboard is a standout for me, with its relatively light touch but intuitive snap that lets you know just when you've pressed a key. One key, next to the power button, houses the fingerprint reader, which some may prefer for unlocking their device. I found that I was able to get up and running at just about my normal typing comfort level and speed within a matter of hours...with one major caveat.

You see, this keyboard pitches a slight curveball to those of you with ingrained typing habits—there are four special keys assigned to HP services along the right side of the keyboard. What this means is that the keys on the edges of the keyboard are sometimes narrower and everything is squished toward the left side. Sometimes that meant when reaching for backspace, I'd overreach and hit one of these gray keys instead. Unfortunately,

these buttons cannot be remapped using any of HP's included utilities, and they're meant to point toward some subscription services you'll need to pay for. We'll get into those a little later in the review.

The smooth glass touchpad was a nice surprise. It has a haptic feedback mechanism, like what you'd find on an Apple laptop, using a linear motor to simulate clicks. It feels really great to use, and you'd be hard-pressed to tell it's not actually clicking a mechanical button down. While the palm detection could use a little improvement, scooting the cursor around the interface and dragging files here and there was no problem at all.

DISPLAY, SPEAKERS, AND WEBCAM

Unlike with many laptops I've tried in recent months, I'm going to start this section with the speakers. These speakers are super impressive! Everything I threw at them sounded incredible, from loud action

sequences in movies to spoken content, and even the grueling abuse of pingy, bleepy electronic music. If you use your laptop as your main entertainment system, the Dragonfly Pro's quad speaker system can play just about anything and make it sound lively without distortion I could notice. Those upgrading from an older laptop to this HP Dragonfly—your ears are in for a treat.



The keyboard has an intuitive snap that lets you know just when you've pressed a key.



The wider 16:10 screen leaves room up top for a 5-megapixel webcam, two microphones, and an infrared sensor.

The display is nice enough, but especially if HP is aiming for the MacBook Pro 14-inch, it might have a bit more work to do. I found that the Dragonfly Pro has a high contrast, colorful, and especially bright 16:10 display with a peak brightness of around 400 nits. But this screen is fixed at 60hz and doesn't have any next-gen tech like mini LED for improved contrast, much less higher refresh rates for gaming or just making the interface look smoother. You get all these things with the high-end MacBook Pro models. One thing to note is that HP has opted for rounded corners on the LCD, which admittedly is a nice match for the rounder look of Windows 11.

The wider 16:10 screen leaves room up top for a 5-megapixel webcam, two microphones, and an infrared sensor. That lets you choose to unlock your laptop with facial recognition, which remains something Apple hasn't put into its laptops...ever. The webcam has a bunch of useful features built into HP's

myHP app, which you can access with a dedicated key on the keyboard.

Autoframing is done rather well here and I found that my face was well exposed and detailed even with this feature turned on. Audio was about what I'd expect for a work-focused machine, and you'll find two noise-reduction settings

(conference and personal), which let you control how much background sounds get into your Teams or Zoom calls.

THE SUPPORT UPSELL

HP seems to be angling to turn its laptops into more of a subscription service, thanks to the inclusion of something it calls Pro Live. Instead of taking your computer into a store for tech help, you're a keyboard button away from reaching a human via either voice or text chat. By making a single key send you right into the myHP app, it's clear the company wants to get users used to having that function close at hand.

The HP Dragonfly Pro gives every buyer a year of warranty with Pro Live support included. For an added fee of \$10.99 per month, users can extend their access to live support up to 36 months and also add accidental damage protection for up to one replacement computer per year. I can see why someone would find this appealing



The HP Dragonfly Pro gives every buyer a year of warranty with Pro Live support included.

(especially a freelancer without an IT department), but if I'm honest, it's hard for me to imagine instances where I'd need instant help but also still have a computer that's working well enough to run the support software.

Personally, I'd rather have a normal keyboard layout or the power to remap these three keys to do something different than access myHP settings and features. The one olive branch HP has handed users is the generic ellipse key, which is the only one you can program yourself. Otherwise, the three keys on top of it—mapped to myHP's control panel, support access, and camera settings—are not yours to alter.

PERFORMANCE

If you need an overachieving Windows laptop in an unassuming body, the HP Dragonfly Pro

is all that. While we'd expect an Intel P-class chip in a machine of this kind, HP has opted for the latest mobile Ryzen 7736U from AMD instead. Ryzen is a formidable force in big desktop PCs, this HP manages to use the efficiency of this chip to great benefit. With its 8 cores and 16 threads (all of which are high-performance), along with strong embedded Radeon graphics, we found that it ran rings around similar

systems equipped with 12th gen Intel and Xe Graphics.

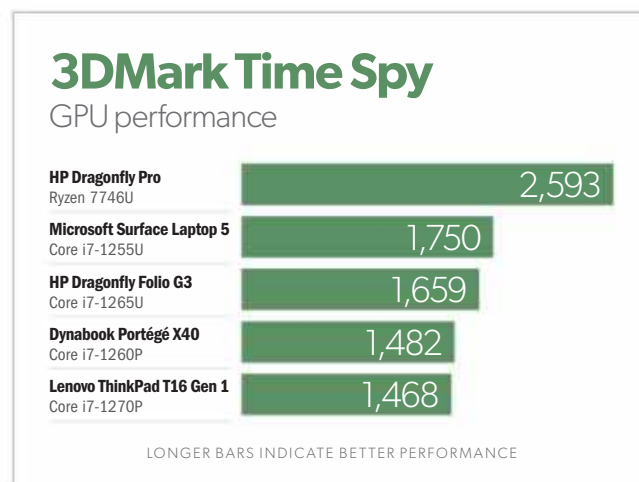
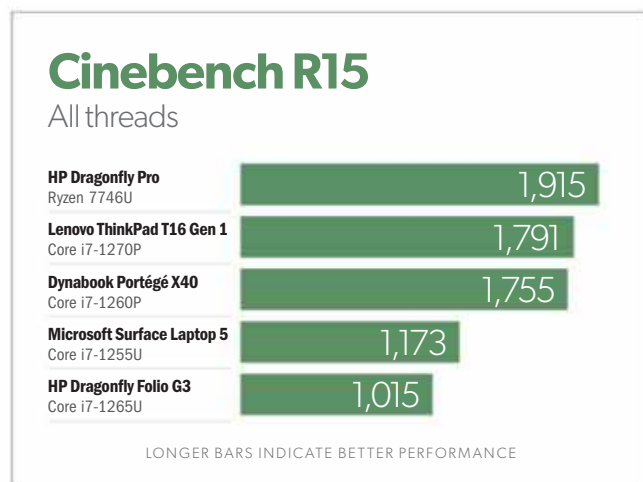
We benchmark every laptop with the PCMark 10 suite. This software gives us a great baseline, using everyday tasks to gauge a computer's true performance. Due to its 8 powerful cores, the HP Dragonfly Pro keeps pace with and beats competing Intel-based laptops that have 12 cores. Rest assured that

PCMark 10 Overall

CPU performance

HP Dragonfly Pro Ryzen 7746U	5,914
Lenovo ThinkPad T16 Gen 1 Core i7-1270P	5,553
Dynabook Portégé X40 Core i7-1260P	5,414
HP Dragonfly Folio G3 Core i7-1265U	4,722
Microsoft Surface Laptop 5 Core i7-1255U	4,230

LONGER BARS INDICATE BETTER PERFORMANCE



this laptop, despite its thin profile, packs in more than enough power for all kinds of tasks.

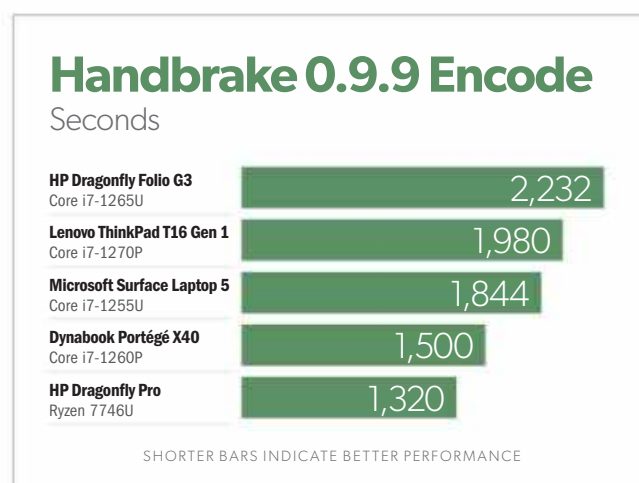
In this performance test, we use Cinebench R15 to get a sense for how well all a laptop's processors work together to render 3D graphics. We found that the HP Dragonfly Pro acquitted itself very well, although it did not significantly surpass the Intel-powered competition.

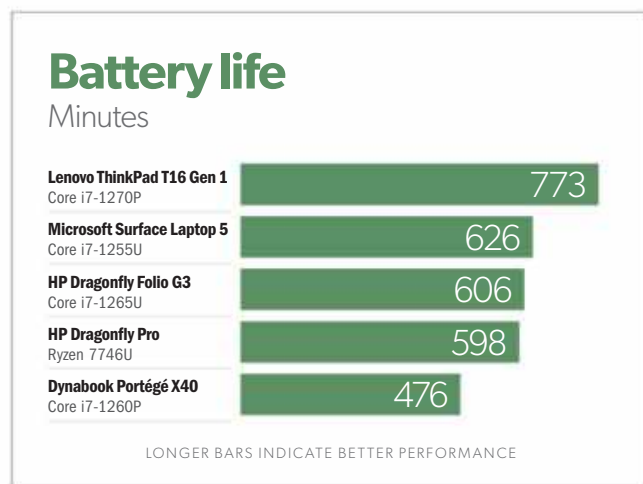
Though your typical Intel slim notebook has better-than-ever graphics, AMD's Radeon cores are still a cut above. When running the 3DMark Time Spy benchmark, the HP Dragonfly Pro showed off impressive performance without a separate GPU chip, putting recent Intel Xe Graphics test results to shame.

I was curious, so I downloaded and played *Forza Horizon 4* and took it for a spin. I saw consistent 60 fps performance on medium settings, which other ultrabooks could only wish for. Gamers with day jobs—the HP Dragonfly Pro can just as handily

help you best Excel workbooks *and* your Steam library.

In our final performance chart, we use Handbrake and time how long it takes to turn an HD movie into a tablet-friendly file that's heavily compressed. The HP Dragonfly Pro was able to spin up and tackle this challenge faster than many other thin laptops in recent memory, taking far less time than other high-quality notebooks like the Surface Laptop 5 and its cousin, the HP Dragonfly Folio G3.





BATTERY LIFE

If you're expecting battery life that is world-beating from the HP Dragonfly Pro, you might be a little disappointed. In our looping video battery life rundown, we measured a couple minutes short of 10 hours of playback. When compared to similar 13-inch ultraportable notebooks, it's basically middle-of-the-pack.

But when you take a closer look at that mid-pack, you realize that the Dragonfly Folio G3 and Surface Laptop 5 both run on lower-power U-class Intel chips. With that in mind, you're getting a huge boost in computing and graphics performance while getting battery life competitive with that of weaker machines. The HP Dragonfly Pro runs two hours longer than the performance-focused Dynabook Portégé X40, which shows how well balanced this AMD-powered notebook is.

BOTTOM LINE

It's been a while since I saw a computer I tested that I'd actually want to own, but I'd say

that the HP Dragonfly Pro checks off most of the boxes for this freelancer. It feels nice to use, is zippy and responsive, has great speakers, and even has a relatively sane price. Although it's an unorthodox choice to pick AMD for this kind of machine, it's clear that when Ryzen is given a chance to shine, it can kick a lot of butt.

As to whether I'd take this over a MacBook Pro 14 with the new M2 Pro chip—well, that's a tricky question. Apple's latest systems have incredible screens, lots of ports, magnetic charging, and heaps of efficient power to boot. But those models also start at the eye-watering price of \$2,000—\$600 more than this HP with fairly close specs, too. If you don't have a strong preference for macOS, you'll get a lot of value with the HP Dragonfly Pro. It's efficient and long-lasting, and, unlike the Mac, it can actually flex its muscles and play games during your downtime. 🔌

HP Dragonfly Pro



PROS

- Premium materials.
- Powerful AMD Ryzen chip.
- Surprising four speaker setup.
- Good battery life.

CONS

- All myHP keyboard keys should be remappable.
- No user upgradeable components.
- No headphone jack.

BOTTOM LINE

Did HP build a MacBook Pro killer just for freelancers?

\$1,399



Avira Prime for Windows: Comprehensive, user-friendly AV

Avira Prime offers a lot for the money, including good protection. **BY LANCE WHITNEY**



To provide thorough protection, today's security products must do more than just scan for viruses and malware. They need to check for harmful internet traffic, intrusive browser tracking, privacy issues, outdated software, and weak passwords, among other items. One product providing all that and more is Avira Prime for Windows (fave.co/41gllHL).

Designed for all supported versions of Windows, Avira Prime packs a lot into one program. Under the banner of security, the software includes the usual virus protection but throws in a software updater and a firewall. In the area of privacy, Avira Prime provides a file shredder, an identity-theft monitor, a password manager, and an online tracking blocker. And to help boost your PC's performance, the program offers a driver

updater, a battery saver, a duplicate file finder, a disk space optimizer, and a few other tricks.

Like most paid security products, Avira Prime charges a subscription rate based on the number of PCs and devices you want to protect and the length of the plan—\$9.99 per month, \$59.99 per year, or \$189.99 for two years for five devices, and \$12.99 per month, 129.99 per year, or \$249.99 for two years for 25 devices. The devices protected under your chosen plan can include Windows PCs, Macs, iPhones, iPads, Android devices, and web browsers. A free 30-day trial lets you check out the full program on up to five devices.

AVIRA PRIME INSTALLATION

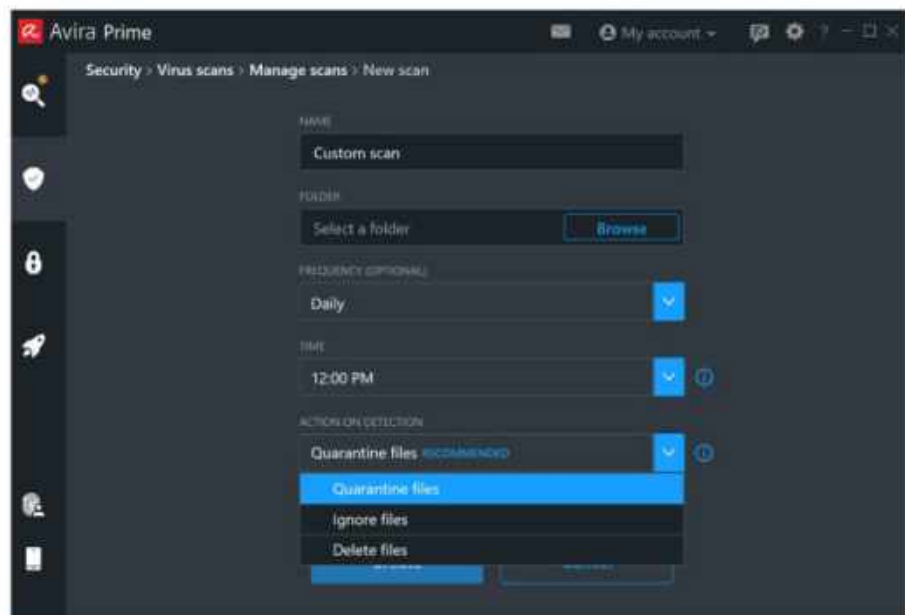
Installing Avira Prime is quick and simple, with just a small status window showing you the progress. After the installation is done, the program prompts you to run a smart scan to look for a variety of potential problems, including viruses, privacy concerns, performance obstacles, and outdated apps. Upon checking your system, the scan alerts you to any issues. From here, you can view more details on the issues and select the ones you want automatically fixed.

AVIRA PRIME FEATURES

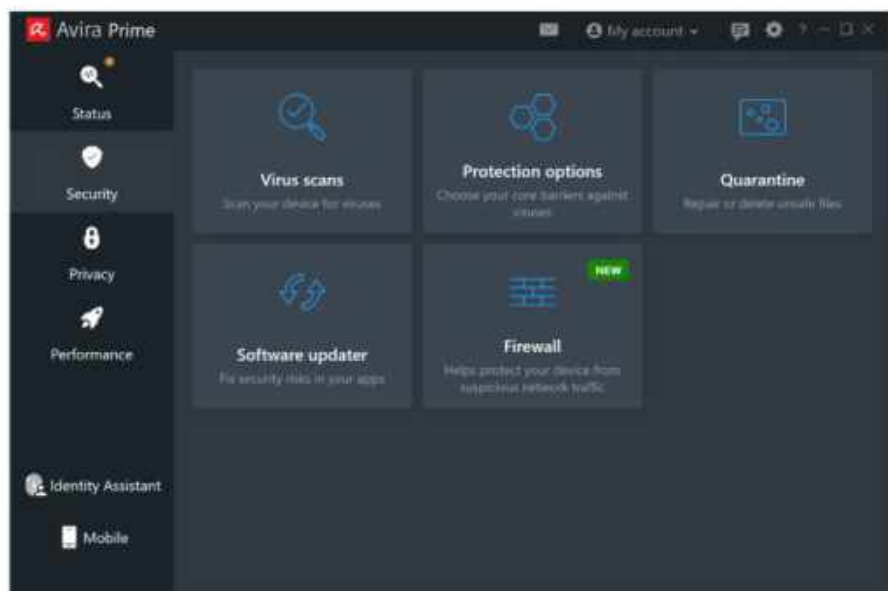
The main dashboard is well designed, organizing its tools into three different categories—Security, Privacy, and Performance. Beyond running the smart scan, you can easily drill down to each category and tool.

Security Options

Under Security, the virus protection offers a few different types of scans. A full scan checks your entire PC, either immediately or at a scheduled frequency—daily, weekly, or monthly. A quick scan checks only certain folders and vulnerable areas immediately or at a scheduled day and time. You can also create a custom scan in which you choose the folders and the frequency. With a full or custom scan, you're able to specify whether



Beyond the full and quick scans, a custom scan lets you choose the location, frequency, and action in the hunt for malware.



The Security area offers tools for virus protection, a software updater, and a firewall.

updater, which scans your PC for outdated applications and can automatically update them. Additionally, a firewall attempts to block malicious or suspicious apps and other activity coming through your network. You have full control over the firewall, so you can modify existing rules to allow or block specific processes, add new rules, or turn off the firewall completely.

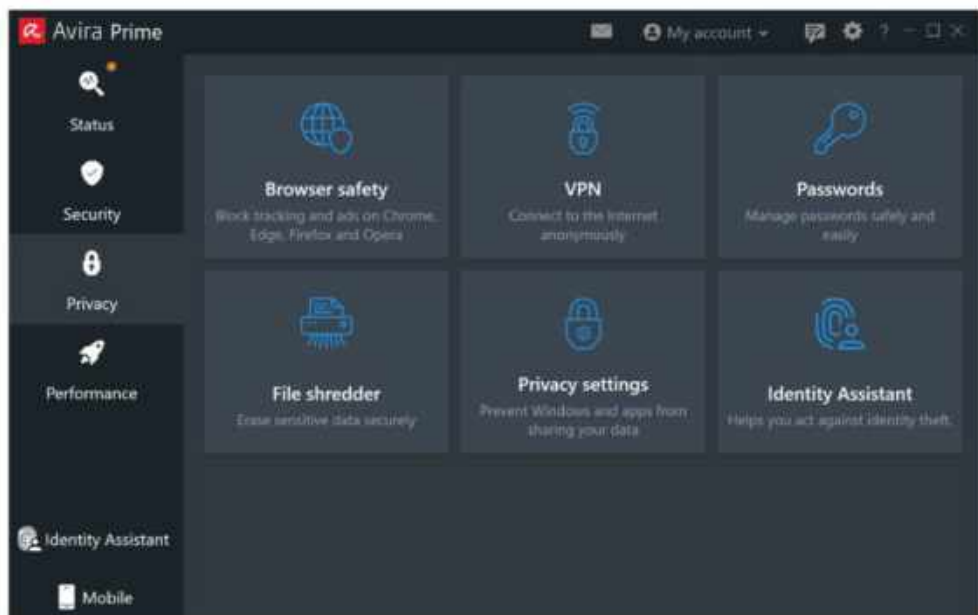
malicious files should be quarantined, deleted, or ignored.

Naturally, Avira Prime offers real-time scanning with three options enabled by default. The virus protection prevents malware from trying to infect and modify files on your computer. The web-based protection tries to defend you from online threats. And the ransomware protection aims to prevent hackers from locking your device or encrypting your files.

Also under Security is a software

Privacy Options

In the area of Privacy, the Avira Safe Shopping extension works with all the major browsers to keep you away from malicious sites and

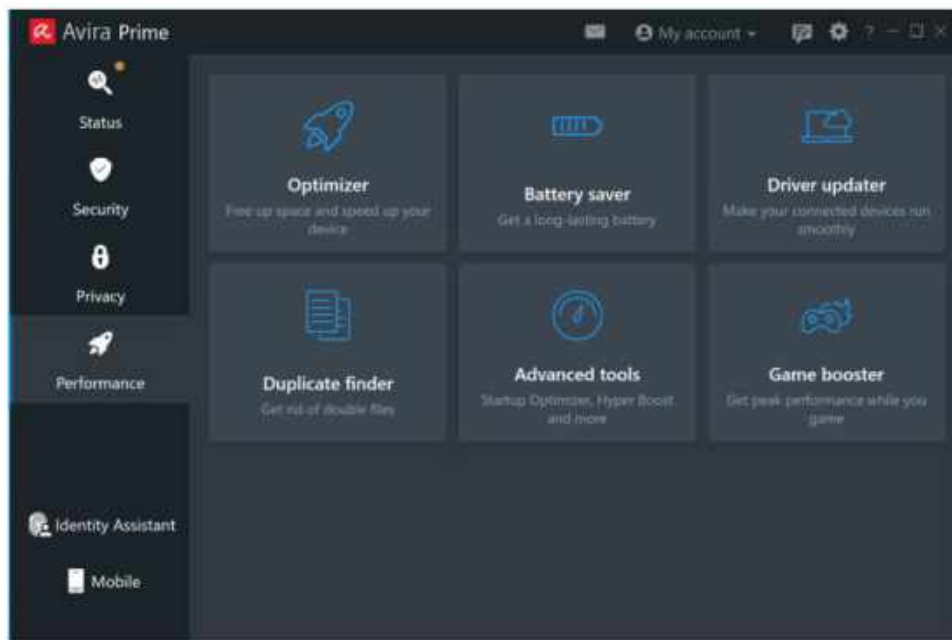


In the privacy area are a web tracking blocker, VPN, password manger, file shredder, and identity assistant.

prevent tracking by ad networks. A built-in VPN lets you choose different locations around the world through which you can securely route web traffic. You're able to keep the VPN on all the time or just for certain Wi-Fi networks. Next on the list is a file shredder that will permanently delete files, thus making it harder for anyone to recover them.

The built-in password manager requires that you set up an account and a master password with Avira and install the required extension in Microsoft Edge, Google Chrome, and/or Firefox. From there, Avira will suggest and save a strong password when you create a new account and automatically enter the credentials when you need to sign in. The password manager is also available as a mobile app for iOS and iPadOS as well as Android.

Another Privacy tool is an identity assistant. If enabled, this one will monitor your email address for Dark Web activity and alert you if any of your personal data has been compromised. As the icing on the cake, a Privacy settings tool gathers all the Windows privacy options in a single place so you can



Under Performance you'll find a space optimizer, battery saver, driver updater, and more.

easily manage each one. You can even choose a predefined level of privacy, and the program will apply it for you.

Performance Options

Finally, under the Performance area is an optimizer that will free up space, clean cookies and broken Registry entries, and try to speed up your PC. The results identify junk files, downloads, and slow startup apps that you can opt to remove or fix. The battery saver displays your current battery status and lets you choose a specific power plan to better extend your battery charge. A driver updater scans for outdated drivers and offers to update any old ones.

A duplicate-file finder scours your PC for duplicate files and removes any you don't

need. A game booster aims to optimize your PC if you're playing a full-screen game that needs more CPU, memory, and video resources. Further, the startup optimizer looks for apps and other items that can be removed from your startup routine, while a hyper-boost option analyzes and tries to shorten your startup time.

To cap off all the features, Avira Prime provides a detailed Settings menu where you control key options for the three different categories. There's also an online dashboard that shows you all the devices on which Avira Prime is installed along with access to the built-in tools, links to helpful tips and documents, and a page for customer support.

WHAT IS AVIRA PRIME'S PERFORMANCE IMPACT?


To gauge the impact of Avira Prime on PC performance, I ran before and after benchmarking tests using the PC Mark, 3D Mark, and Procyon benchmark programs. The results showed just a minor impact on performance with Avira Prime installed, indicating that the software doesn't hog your system resources.

Trying to access the different test files from the EICAR testing site (fave.co/3L5ZUo9) prompted the software to flag the files themselves as unsafe, preventing me from downloading them directly. I was able to download the two EICAR zip files, but

when I tried to extract them, Avira blocked and quarantined them as potential threats.

AV-Test reviews throughout 2022 (fave.co/3mAZUn0) awarded Avira Internet Security top marks for protection, performance, and usability. Older reviews from 2020 and earlier gave Avira Antivirus Pro high grades in the same areas. Reports from AV Comparatives in 2022 (fave.co/3MKkwnn) awarded Avira Prime stellar grades for protection and performance.

BOTTOM LINE

Avira Prime offers not only effective malware defenses but a host of other tools designed to protect you from both online and offline threats. In spite of all its features, the program is well designed and easy to use. For those reasons, Avira Prime is well worth the subscription price. 

Avira Prime for Windows



PROS

- Strong security with a reasonable subscription price.
- Well designed and user friendly.
- Offers a host of features in the areas of security, privacy, and performance.

CONS

- No subscription option for fewer than five devices.

BOTTOM LINE

Avira Prime for Windows is an inclusive and effective security product offering protection against malware, outdated software and drivers, suspicious network traffic, weak passwords, browser-based tracking, and identity theft, among other risks.

\$59

Nvidia GeForce RTX 4070: Highly efficient 1440p gaming

If you want superb 1440p gaming performance backed by excellent features, the RTX 4070 delivers. It's less well suited for 4K gaming. **BY BRAD CHACOS**



Finally, Nvidia's 70-class GeForce graphics cards get more than 8GB of memory. And finally, there's a member of the RTX 40 series possibly worth buying other than the \$1,600 flagship (fave.co/3O1pryl). Meet the 12GB GeForce RTX 4070. It hit the streets for \$599 on April 13.

The GeForce RTX 4070 delivers exceptionally fast 1440p gaming performance while sipping power, a combination that let Nvidia create an adorably tiny Founders Edition version of the GPU. Those frame rates climb even higher in games that support Nvidia's DLSS upscaling technology, and astronomically higher in games embracing

DLSS 3 Frame Generation—even with ray tracing flipped on. Exceptional software features like Nvidia Broadcast, Reflex, and RTX Video Super Resolution help sweeten the pot.

The RTX 4070 may be worth considering, but it's not a slam-dunk recommendation. Paying \$599 for a 70-class graphics card explicitly marketed for 1440p gaming deeply aches, especially when Nvidia made technical decisions that actively hurt the GPU's 4K gaming prowess. We'd also like to see 16GB of memory in a \$600 graphics card in 2023. Still, while the RTX 4070 costs \$100 more than its predecessor, it's nowhere near as insultingly overpriced as the \$800 RTX 4070 Ti (fave.co/40h209p) and \$1,200 RTX 4080 (fave.co/40gi3UE).

With those broad-strokes impressions out of the way, let's dig into the details.

SPECS

Nvidia's \$599 GeForce RTX 4070 uses a cut-down version of the 4N "Ada Lovelace" AD104 GPU found in the RTX 4070 Ti. Here's a look at its core specifications:

Graphics Processing Clusters: 4

Texture Processing Clusters: 23

Streaming Multiprocessors: 46



Nvidia's \$599 GeForce RTX 4070 uses a cut-down version of the 4N "Ada Lovelace" AD104 GPU found in the RTX 4070 Ti.

CUDA Cores: 5888

Tensor Cores: 184 (4th generation)

RT Cores: 46 (3rd generation)

Texture Units: 184

ROP Units: 64

Base Clock: 1920MHz

Boost Clock: 2475MHz

Memory Clock: 10500MHz

Memory Data Rate: 21Gb/s

Total Video Memory: 12GB GDDR6X

Memory Interface: 192-bit

Total Memory Bandwidth: 504GB/s

Transistor Count: 35.8 billion

Connectors: 3x DisplayPort, 1x HDMI

Power Connectors: 2x PCIe 8-pin cables (adapter in box) OR 300W or greater PCIe Gen 5 cable

Power Supply Required: 650W

This all represents solid advances over the technology inside last generation's \$499 RTX 3070 (fave.co/3mCGRIO) and \$599 RTX 3070 Ti (fave.co/3j3S9UL), though it's a

significant step back from the 4070 Ti's might—that card runs roughly 15 to 25 percent faster, depending on the game and resolution. The performance gap widens slightly at 4K resolution.

You don't really want the GeForce RTX 4070 for 4K gaming anyway—a conclusion that's supported by Nvidia's decision to market this GPU around playing games at 100 frames per second at 1440p resolution. As we discussed extensively in the RTX 4070 Ti's review (fave.co/40h209p), Nvidia equipped the AD104 GPU used by both 4070 cards with a surprisingly narrow 192-bit memory bus, which constrains overall memory bandwidth. The RTX 4070 comes with GDDR6X, faster memory than its predecessor, as well as a much larger L2 cache (36.8K) for keeping more tasks on the GPU itself. Both of those help boost memory performance, but I wouldn't buy this card for 4K gaming—only 1440p.

From PCWorld's RTX 4070 Ti review:

By contrast, the RTX 3080 (fave.co/38NTnOi)—which, again, was a higher-tier card that cost \$100 less than the 4070 Ti—wielded a 320-bit bus, which is typical for a high-end GPU. Even the already-pandemic-overpriced \$600 RTX 3070 Ti (fave.co/3j3S9UL) had a 256-bit bus. You had to go all the way down to the \$330 RTX 3060 (fave.co/3IUcqKX) to find an Nvidia GPU with a 192-bit bus last generation.

That goes doubly so given its 12GB memory capacity—a very welcome upgrade over the 8GB that Nvidia's 70-class remained stuck on since the GTX 1070's launch in 2016 (fave.co/3mFF1XH). That said, with games gobbling ever-increasing amounts of VRAM (fave.co/3oIMf3L) now that the latest console generation (and 16GB of shared memory) are the standard, I'd be nervous about buying a graphics card for 4K gaming with less than 16GB of memory. The RTX 4070's 12GB should be fine for most games at 1440p, though note that flipping on ray-tracing effects eats heavily into VRAM as well.

This is a tremendously energy-efficient graphics card, which let Nvidia craft a smaller,



The GeForce RTX 4070 Founders Edition is substantially smaller than the gargantuan RTX 4080 FE.



The 12VHPWR power connector on the RTX 4070. You'll need to use the included adapter to run it with standard cabling.

totally adorable dual-slot version of its Founders Edition board. Nvidia's fantastic-looking FE designs treat almost every part of the card as a heatsink and utilize unorthodox flow-through fan cooling. That all holds true with the RTX 4070 FE—it's just so *much smaller* than its triple-slot siblings. This beast will be popular in high-end small form-factor gaming builds.

Nvidia equipped the RTX 4070 Founders Edition with a single HDMI 2.1 port as well as three DisplayPort 1.4a connections. It also uses the new 16-pin 12VHPWR connector despite its relatively modest power demands—you only need a 650W supply—so be prepared to look at the unsightly too-short adapter plugs in your case if you don't want to invest in a new ATX 3.0 power supply, fave.co/3mB8H8u (or at least custom 12VHPWR

cords). FE cards don't include extra features like dual-BIOS switches or customizable RGB lighting.

As an RTX 40-series "Ada Lovelace" graphics card, the GeForce RTX 4070 also supports Nvidia's staggering arsenal of features, including DLSS, DLSS 3 Frame Generation (fave.co/3uTG8nh), Nvidia Broadcast, RTX Video Super Resolution (fave.co/3lpiRZe), superb

ray-tracing prowess, Nvidia Reflex (fave.co/3su7Cj0), and more. Nvidia's software stack is a *major* feather in its cap. It's worth noting that while the RTX 4070 supports AV1 encoding, new to GeForce this generation (fave.co/3Ys2Ekw), product manager Justin Walker told me the 4070 only includes a single AV1 encoder rather than the pair found in higher-priced RTX 40-series offerings.

Got it? Good. Let's get to the benchmarks.

OUR TEST SYSTEM

We test graphics cards on an AMD Ryzen 5900X PC used exclusively for benchmarking GPUs. We now test with PCIe Resizable BAR (also known as Smart Access Memory on Ryzen systems) active, as most modern gaming PCs released in the last four years support the performance-boosting feature,

either natively or via a motherboard firmware update. Nvidia also recommends turning on the optional “Hardware-accelerated GPU scheduling” option in Windows to let the RTX 40 series stretch its legs to the fullest, so we’ve made that tweak as well. Most of the hardware was provided by the manufacturers, but we purchased the storage ourselves.

- AMD Ryzen 5900X, stock settings
- AMD Wraith Max cooler
- MSI Godlike X570 motherboard
- 32GB G.Skill Trident Z Neo DDR4 3800

memory, XMP active

- Corsair HX1500i power supply, fave.co/40eAvNA (and optional \$20 12VHPWR 600 cable [fave.co/3EMLruz] for Nvidia GPUs)

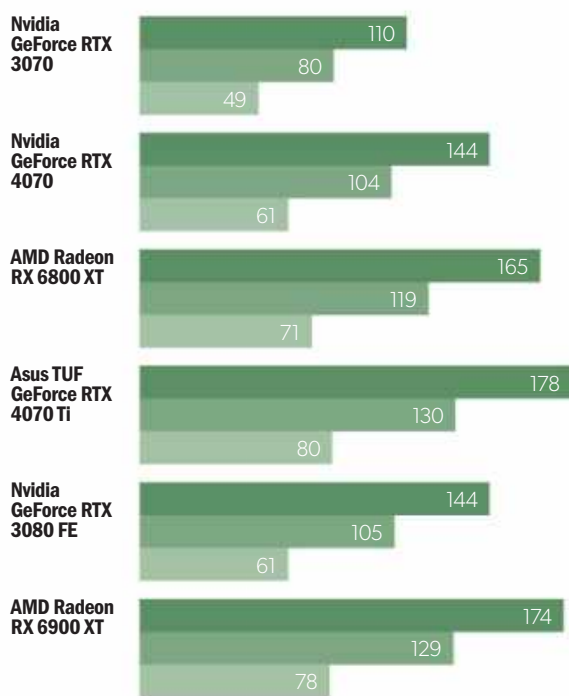
- 1TB SK Hynix Gold S31 SSD (fave.co/3IRPhZM) x2

We test a variety of games spanning various engines, genres, vendor sponsorships (Nvidia, AMD, and Intel), and graphics APIs (DirectX 9, 11, DX12, and Vulkan), to try to represent a full range of performance potential. Each game is tested using its in-game benchmark, sanity-checked by

Call of Duty: Modern Warfare 2 (DX12)

Frames per seconds

1080p 1440p 4K

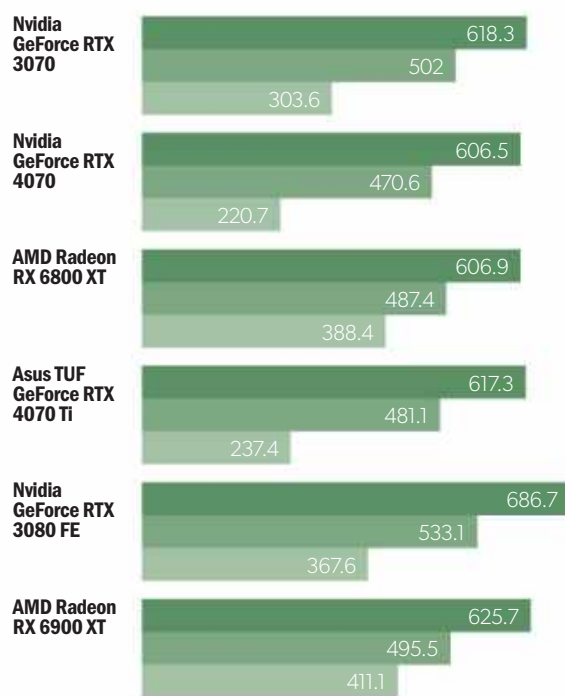


LONGER BARS INDICATE BETTER PERFORMANCE

Counter-Strike: Global Offensive (DX9)

Frames per seconds

1080p 1440p 4K



LONGER BARS INDICATE BETTER PERFORMANCE

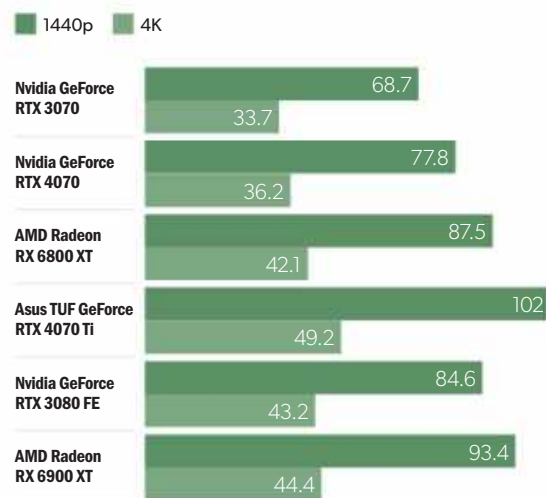
Nvidia's FrameView tool (fave.co/43wo8iG), at the highest possible graphics presets unless otherwise noted, with VSync, frame rate caps, real-time ray tracing or DLSS effects, and FreeSync/G-Sync disabled, along with any other vendor-specific technologies like FidelityFX tools or Nvidia Reflex. We've also enabled temporal anti-aliasing (TAA) to push these cards to their limits.

We run each benchmark at least three times and list the average result for each test. Outside of esports, we've limited our benchmarks to 4K and 1440p resolutions, as those are the natural fits for these juggernaut GPUs (despite the 4070 Ti's paltry bus width). We test features like ray tracing and DLSS in a separate section, as upscaling features like DLSS and AMD's rival FSR tweak the look of games to help them run faster.

We're going to show these benchmarks without going into individual game commentary. In addition to paying attention to how the RTX 4070 performs in

Cyberpunk 2077 (DX12)

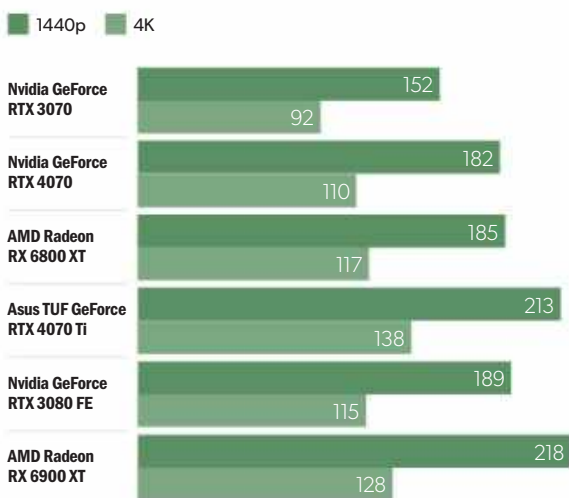
Frames per second



LONGER BARS INDICATE BETTER PERFORMANCE

F1 2022 (DX12)

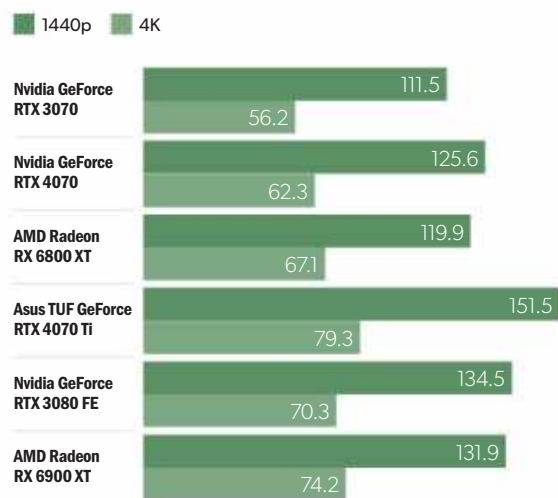
Frames per second



LONGER BARS INDICATE BETTER PERFORMANCE

Gears Tactics (DX12)

Frames per second



LONGER BARS INDICATE BETTER PERFORMANCE

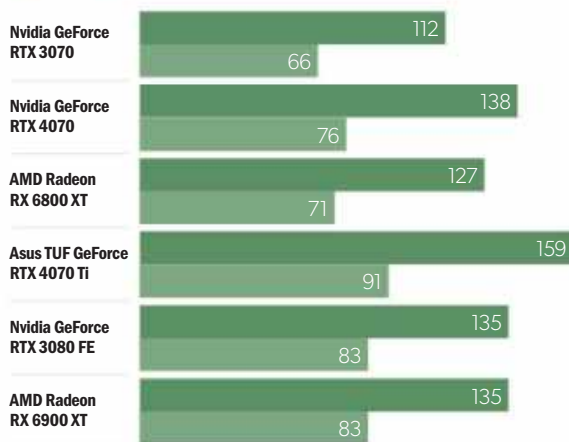
relation to the 4070 Ti, 3080, and 3070, also note how it compares against AMD's Radeon RX 6800 XT and 6900 XT—two last-generation models that are both faster

and more memory-packed than Nvidia's new offering and that can often be found for less on the street. Nvidia's GPUs really wimp in ray tracing and extra features,

Horizon Zero Dawn (DX12)

Frames per second

1440p 4K

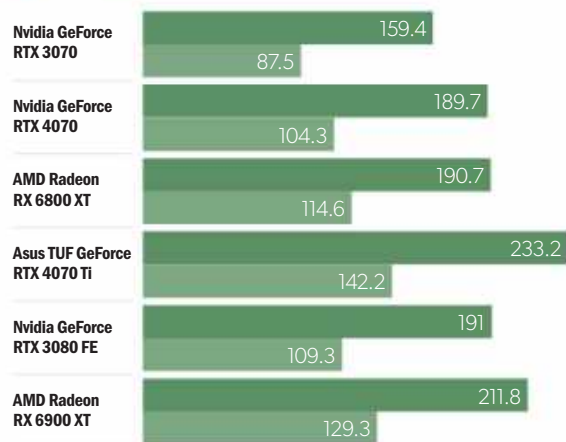


LONGER BARS INDICATE BETTER PERFORMANCE

Hitman 3 (DX12)

Frames per second

1440p 4K

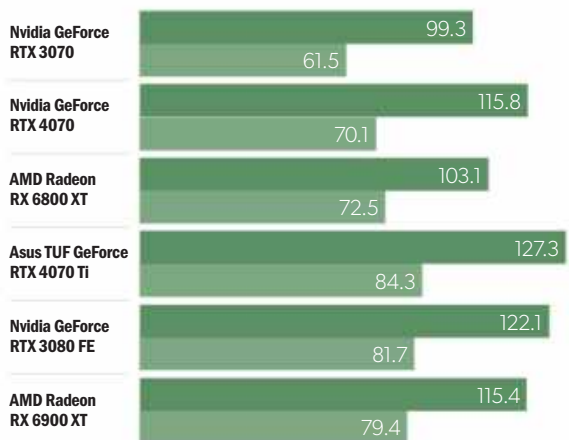


LONGER BARS INDICATE BETTER PERFORMANCE

Total War: Troy (DX11)

Frames per second

1440p 4K

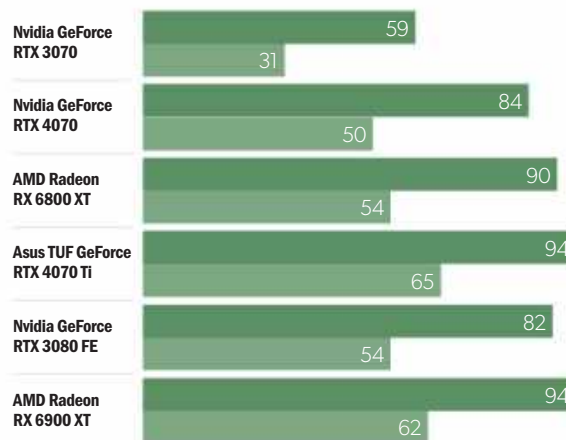


LONGER BARS INDICATE BETTER PERFORMANCE

Watch Dogs Legion (DX12)

Frames per second

1440p 4K



LONGER BARS INDICATE BETTER PERFORMANCE

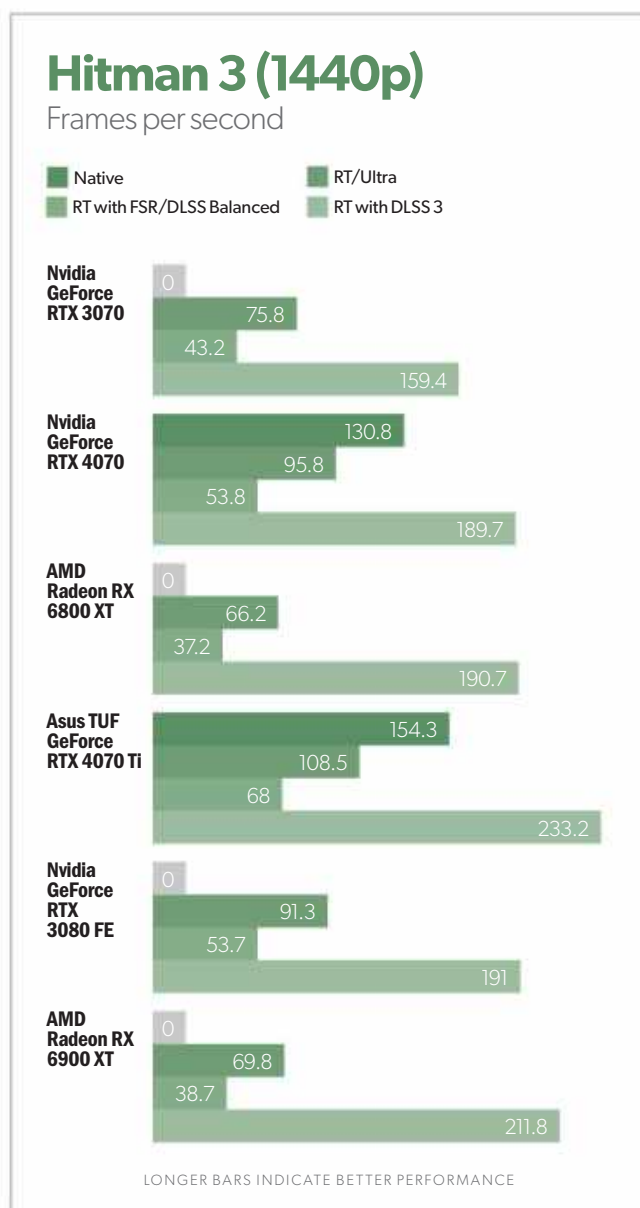
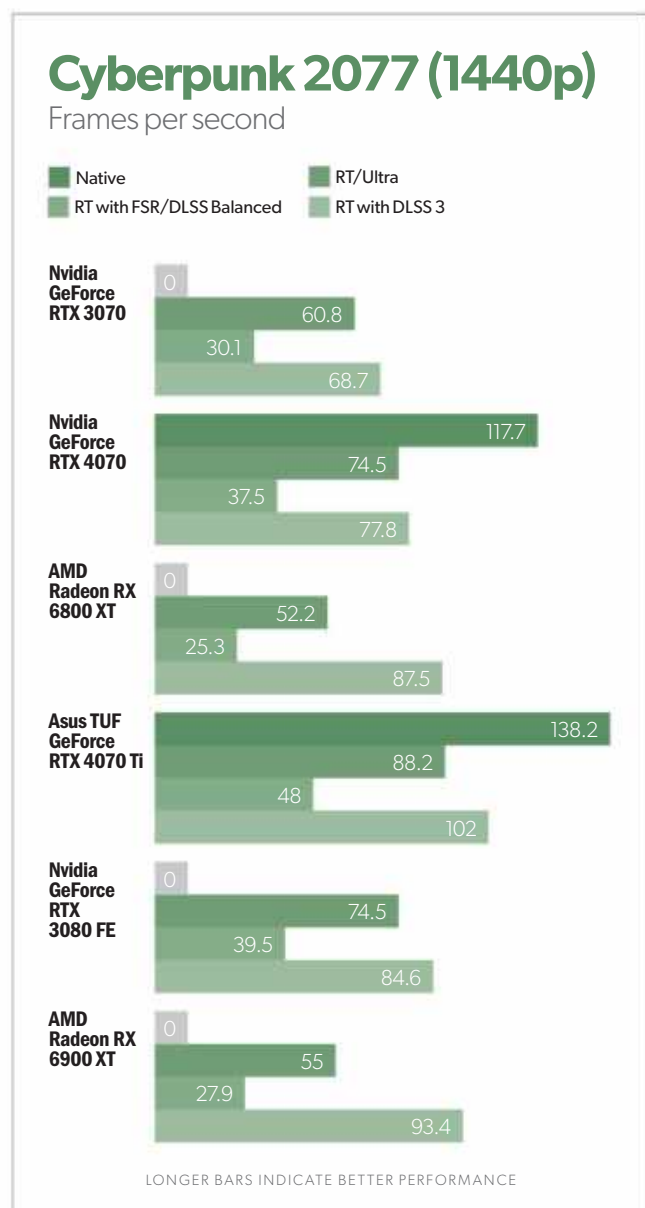
though they lag behind Radeon in raw esports frame rates.

HOW IS THE RTX 4070'S RAY TRACING AND DLSS PERFORMANCE?

In addition to doing traditional gaming tests, we separately benchmark how graphics cards perform with ray tracing enabled at the

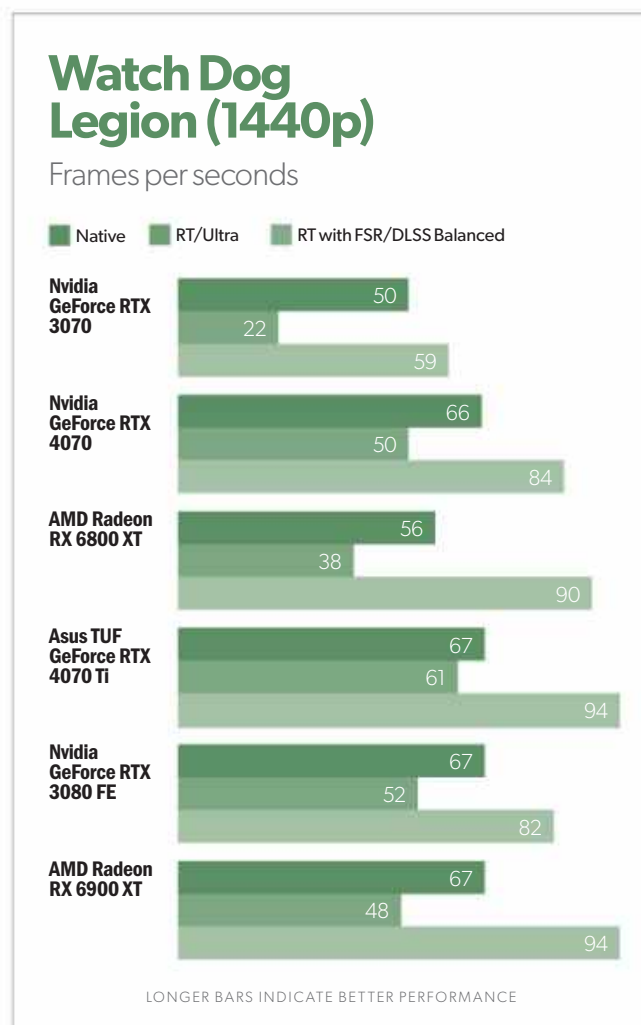
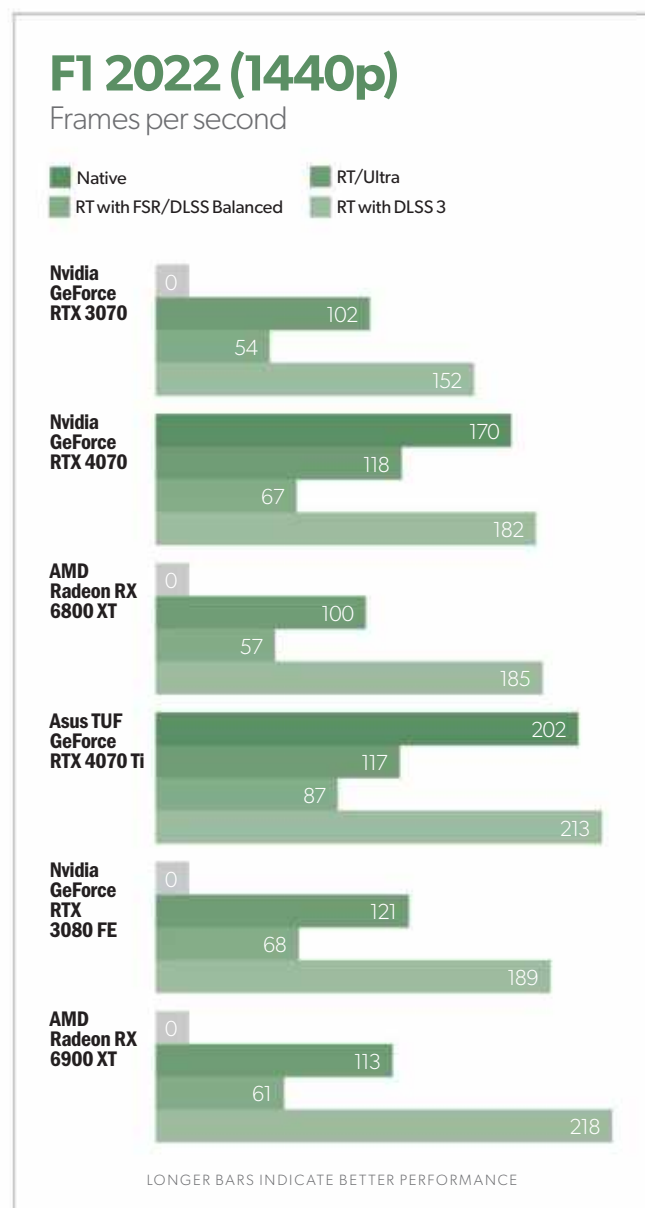
highest possible settings (though we stick to Ultra, not Psycho, in *Cyberpunk 2077*).

Since ray tracing tanks frame rates, we also test how Nvidia and AMD's DLSS and FSR upscaling technologies, respectively, manage to claw back performance using their Balanced quality presets, which straddle the line between optimizing for better image quality and faster frame rates. We've also chosen benchmarks that



show how Nvidia's new DLSS 3 Frame Generation (fave.co/3uTG8nh) can supercharge frame rates and visual smoothness even more by inserting AI-generated frames between every GPU-rendered frame. Nvidia says DLSS 3 is being adopted 7 times faster than DLSS 2 was and can deliver truly transformative visual smoothness in games that support it, but it's only available for new RTX 40-series offerings.

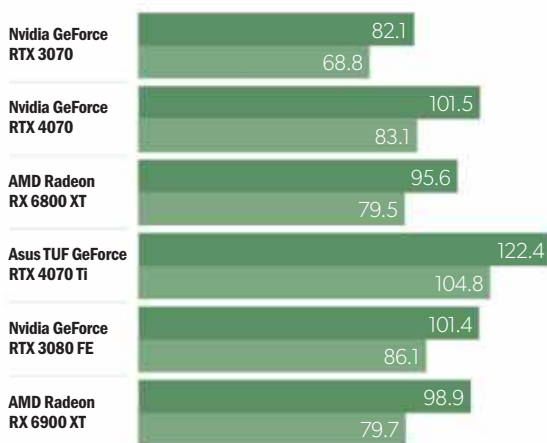
Note that DLSS and FSR both work by rendering a frame at a lower resolution, then scaling it to fit your screen using software smarts. They also have several different quality presets available. Comparing DLSS to FSR in raw frame rate isn't as apples-to-apples as comparing native gaming performance, but it's still worth examining as they're features most gamers will use in the real world. That warning goes doubly for DLSS 3's radical AI frame generation, which *sometimes* generates artifacts and other slight inconsistencies, as Hardware Unboxed's excellent video shows (fave.co/3A8R2YF).



Red Dead Redemption 2 (1440p)

Frames per second

■ DLSS/FSR Balanced On ■ Native



LONGER BARS INDICATE BETTER PERFORMANCE

The charts here show native 1440p performance; native 1440p with ray tracing ultra active; upscaled DLSS/FSR Balanced mode performance with ray tracing ultra active; and, for RTX 40-series GPUs only, DLSS 3 Frame Gen performance with ray tracing ultra active. You can also activate DLSS/FSR or DLSS 3 without ray tracing active for even faster frame rates, but we only tested that scenario in *Red Dead Redemption 2* because there are only so many hours in the day, y'all.

IS THE GEFORCE RTX 4070 POWER EFFICIENT?

We test power draw by looping the *F1 22* benchmark at 4K for about 20 minutes after we've benchmarked everything else (to warm up the GPU) and noting the highest reading

on our Watts Up Pro meter, which measures the power consumption of our entire test system. The initial part of the race, where all competing cars are onscreen simultaneously, tends to be the most demanding portion.

This isn't a worst-case test; this is a GPU-bound game running at a GPU-bound resolution to gauge performance when the graphics card is sweating hard. If you're playing a game that also hammers the CPU, you could see higher overall system power draws. Consider yourself warned.

Despite flinging out fantastic frame rates, the GeForce RTX 4070 absolutely sips power. We have no complaints, just admiration.

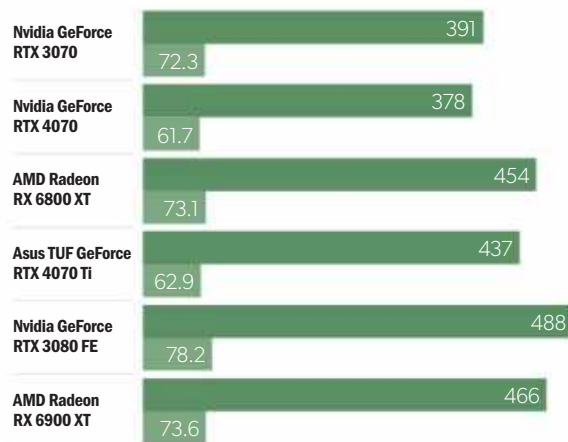
We test thermals by leaving GPU-Z open during the *F1 22* power draw test, noting the highest maximum temperature at the end.

That supreme power efficiency let Nvidia

Whole system power draw

Watts

■ Load ■ Idle



SHORTER BARS INDICATE BETTER PERFORMANCE

craft an adorably tiny Founders Edition model. It isn't the coolest or the quietest GPU around, and custom models will no doubt reach loftier numbers (albeit in much larger packages), but it's still plenty cool and plenty quiet. Again, we have no complaints.

BOTTOM LINE

It depends on what you want in a graphics card, and what you're willing to spend on it.

The GeForce RTX 4070 delivers exceptional 1440p gaming performance in even the most strenuous games, with best-in-class ray-tracing performance if you want to turn those cutting-edge lighting features on. Nvidia's killer software stack enhances every aspect of the GPU, from creation to streaming to gaming, with features like Nvidia Reflex (fave.co/3su7Cj0), Broadcast, RTX Video Super Resolution (fave.co/3lpiRZe), and DLSS 3 Frame Generation (fave.co/3uTG8nh) truly improving your day-to-day experience. If you found yourself nodding along to our defense of the 4070 Ti by a 1440p gamer (fave.co/43DjcUw), you're the prime

audience for the \$200-cheaper RTX 4070.

The RTX 4070 also supports AV1 encoding, unlike previous-gen GPUs, while its incredible power efficiency let Nvidia make its Founders Edition model nice and tiny. It'll fit into most any system.

It's not a slam dunk, though. Nvidia's decision to equip the RTX 4070 with a 192-bit bus and 12GB of memory prevent us from being able to recommend it for long-term 4K gaming, especially with memory requirements only rising in modern games. (We applaud the bump in memory from 8GB to 12GB, but \$600 graphics cards really should have 16GB or more in 2023.)

If you want a 4K graphics card around this price range, complete with more memory, consider AMD's last-generation Radeon RX 6800 XT (fave.co/3TpMdBP) or 6900 XT (fave.co/3TpMdBP) instead (or the 6850 XT



The GeForce RTX 4070 delivers exceptional 1440p gaming performance.



The RTX 4070 is small.

and 6950 XT variants). Both come with 16GB of VRAM, wide memory buses, and run as fast or faster than the RTX 4070, especially at 4K resolution. Radeon GPUs also excel at esports frame rates. The 6950 XT can be found for as little as \$650 (fave.co/41tQ7h2) these days, while the 6800 XT can be found around \$570 (fave.co/41A7YDi). Alternatively, the new Radeon RX 7900 XT (fave.co/3L6AfMg) is a potential consideration at \$850. You give up AV1 encoding, DLSS, and Nvidia's excellent ray-tracing chops and extra features, however. Avoid the \$800 4070 Ti for 4K gaming.

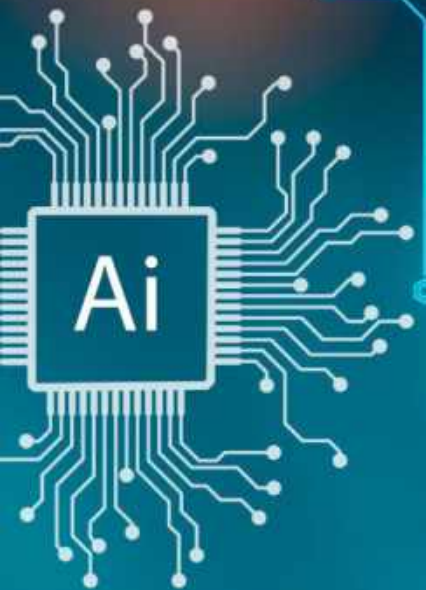
You're giving up something with either side these days. It remains a fairly bleak time for \$500-plus graphics cards. As I said right up top, the \$599 GeForce RTX 4070 is the only current

Nvidia 40-series graphics card potentially worth your money aside from the flagship RTX 4090. That's because Nvidia didn't jack its price as painfully as the \$800 RTX 4070 Ti (fave.co/40h209p) and \$1,200 RTX 4080 (fave.co/40gi3UE), not because it's a good value. The \$599 RTX 4070 is \$100 more than its predecessor, and \$100 less than the RTX 3080. In most games,

the RTX 3080 trades blow or is a handful of frames faster than the RTX 4070. Sure, the RTX 4070's power efficiency and DLSS 3 Frame Gen features are deeply impressive indeed, but in raw gaming performance, Nvidia's 40 series continues to offer stagnant gen-on-gen value, 2.5 years after the 30 series launched. Not every game will support features like DLSS or FSR.

Buy the GeForce RTX 4070 if you want a reasonably sized, highly efficient 1440p gaming beast, complete with access to all the latest and greatest Nvidia software features—and if you're willing to spend \$600 on a graphics card like that. Avoid it for long-term 4K usage, and comparison-shop before you buy (fave.co/3DOEuWk), as last-gen graphics cards may offer better value. 🔌

10 AWESOME YOU CAN D

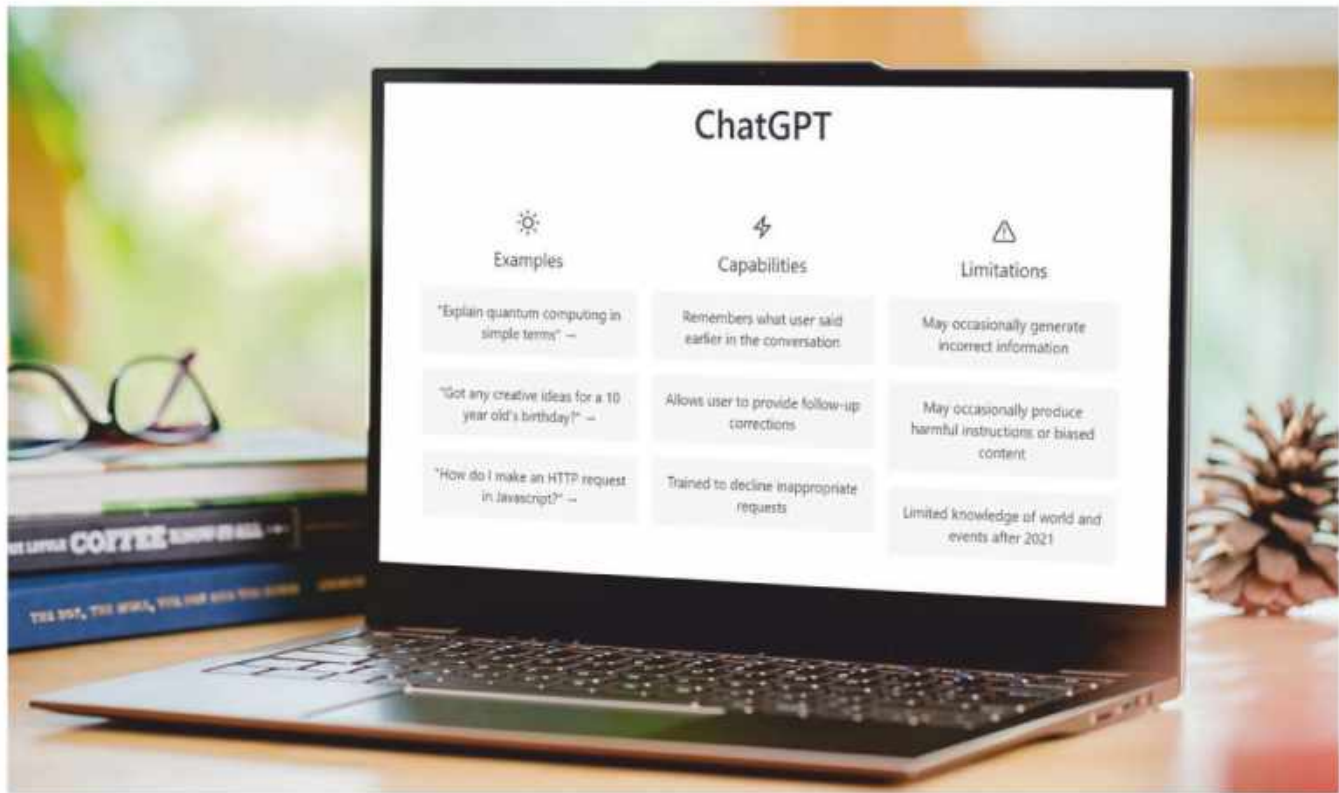


Command Prompt : |

ChatGPT

PUT THIS POWERFUL
CHAT-BASED AI TO WORK.
BY MARSHALL GUNNELL

ELY PRACTICAL TASKS DO WITH **CHATGPT**



ChatGPT can help with a wide range of tasks.

ChatGPT (fave.co/3wnujwM), a powerful language model chatbot developed by OpenAI, has revolutionized the way we interact with artificial intelligence. With its advanced natural language processing capabilities, ChatGPT can help you with a wide range of tasks, from answering trivia questions to composing poetry.

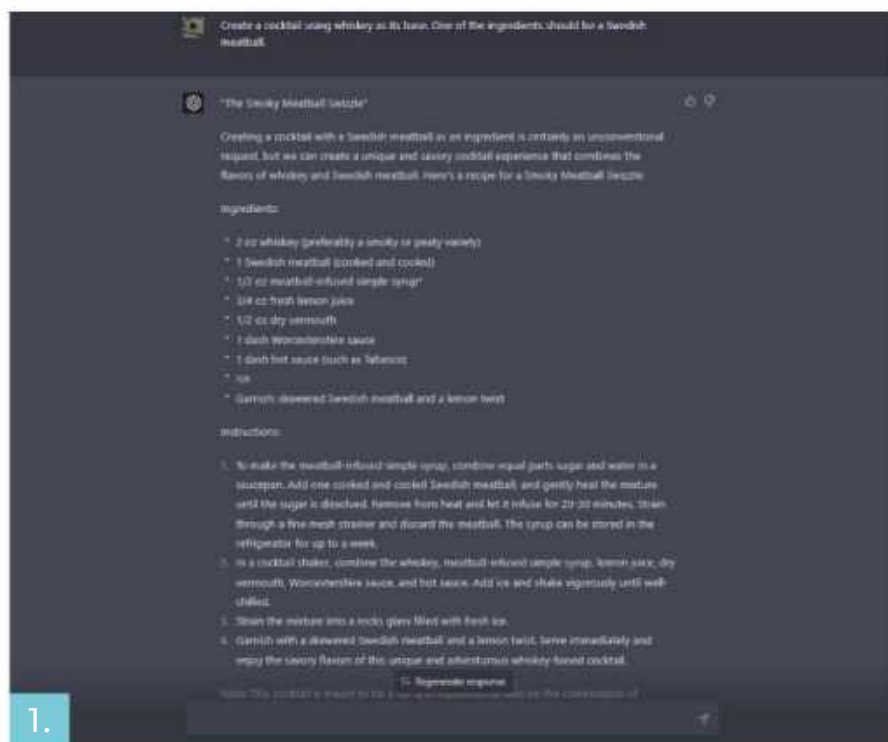
Here are 10 wonderfully fun, awesomely practical ways to put ChatGPT to work.

1. CREATE FUN RECIPES

One interesting thing ChatGPT can do is generate recipes based on user preferences, ingredients, or specific dietary requirements.

Give it a starting point by providing certain information about the desired dish, such as the type of cuisine, the main ingredients you want to use, or any dietary restrictions you may have. ChatGPT will then provide a recipe with step-by-step instructions, ingredient quantities, and cooking tips.

I asked ChatGPT to create a whiskey-based cocktail using a Swedish meatball as one of the ingredients. It quickly acknowledged that this was an unconventional request, but then proceeded to provide a recipe based on my requirements. It even named the cocktail “The Smokey Meatball Swizzle,” though I think “Meatball Manhattan” is a much better name.



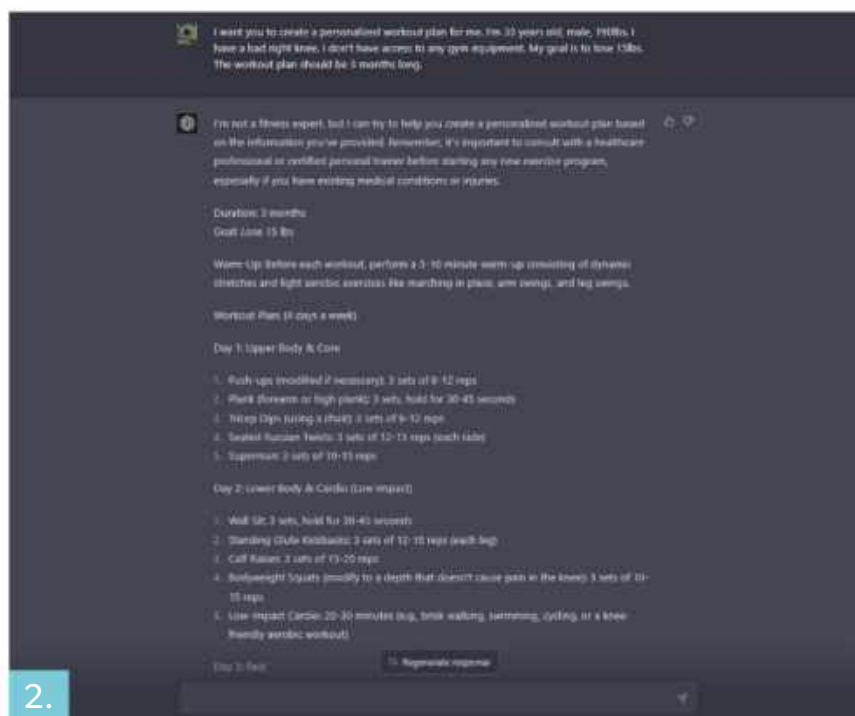
knee. I also mentioned that I don't have access to gym equipment and that my goal was to lose 15 pounds. It let me know that it's important to consult with a healthcare professional or certified personal trainer before starting a new exercise routine and to monitor my form to make sure I don't injure myself. Regardless, it outlined a routine for me based on the information I gave it.

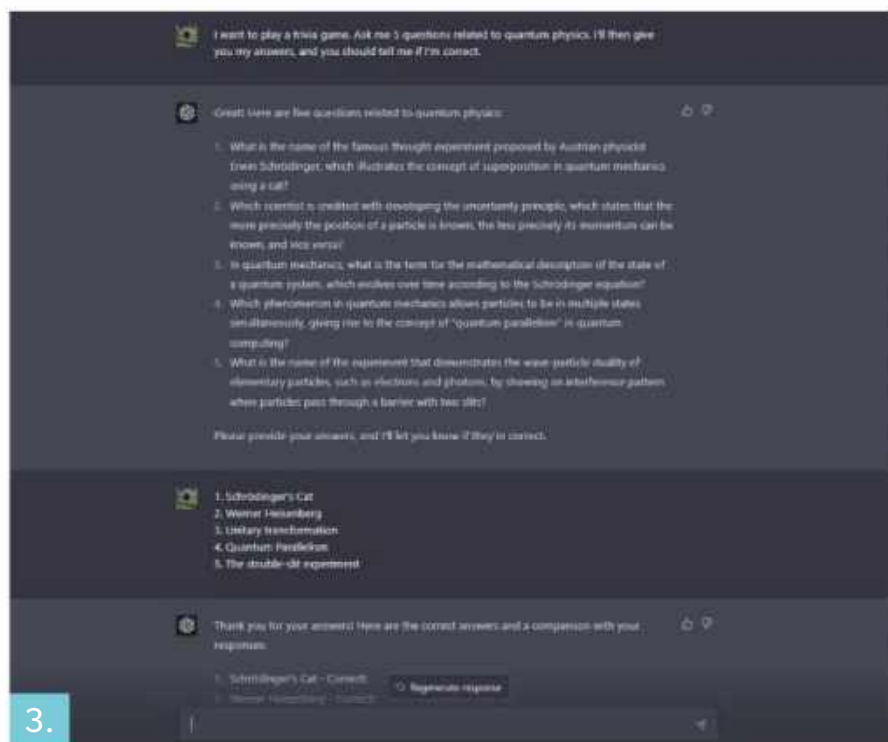
2. DRAFT A PERSONALIZED WORKOUT PLAN

ChatGPT can create personalized workout plans (fave.co/3zZKBqN) tailored to your fitness level, goals, available equipment, health condition, and more. To get started, you'll need to provide some information about yourself, like your basic information, current fitness level, workout experience, goals, health condition, and access to equipment.

I asked ChatGPT to create a 3-month exercise plan for me. I input my age, gender, weight, and told it I have a bad

If you don't know which information to put in, you can ask ChatGPT what it requires to develop the most accurate and personalized workout plan possible.





3. ENGAGE IN TRIVIA GAMES

You can challenge ChatGPT to, or have it create, trivia games by providing questions, answers, or interesting facts on a wide range of subjects. Just tell ChatGPT you want to play, specify the topic or theme you'd like to focus on, and then ChatGPT will generate questions for you to answer. Or you can challenge ChatGPT with your own trivia questions.

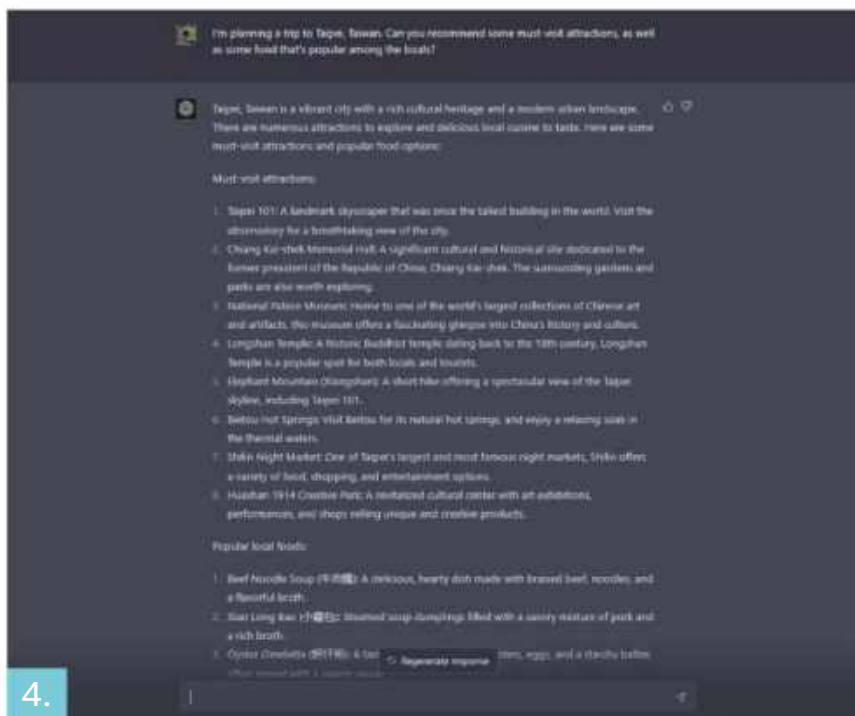
I told ChatGPT that I wanted to play a trivia game with it and asked it to give me

five questions related to quantum physics. I told it I would give it my answers and it should tell me if I'm correct. I got three out of five questions correct (with the help of Google). As it turns out, quantum physics is hard.

4. FREE VIRTUAL TRAVEL GUIDE

ChatGPT can act as a virtual travel guide by providing information, recommendations, and advice about various travel

destinations. One thing to keep in mind is that ChatGPT's knowledge is, at least for now (fave.co/41oryID), based on data up to 2021.



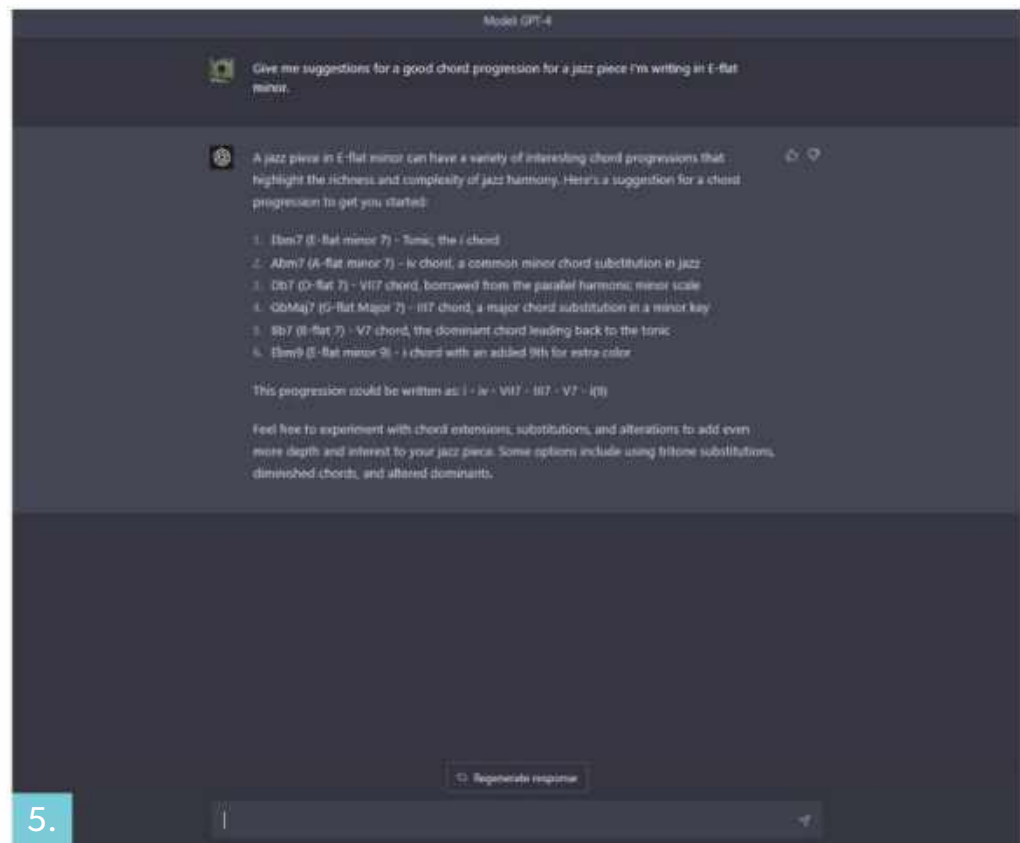
This means that it can't recommend anything that may have popped up more recently, such as a new restaurant. It can still offer valuable insights about places to visit, local customs, cuisines, and other travel-related topics.

I told ChatGPT that I'm planning a trip to Taipei, Taiwan, and asked it to recommend

some must-visit attractions and some food that's popular among the locals. It sent a solid list of places to visit, and the list of food that it recommended was pretty accurate, though I was disappointed it didn't add Dan Bing (fave.co/3L2Oimc) to the list.

5. COMPOSE MUSIC

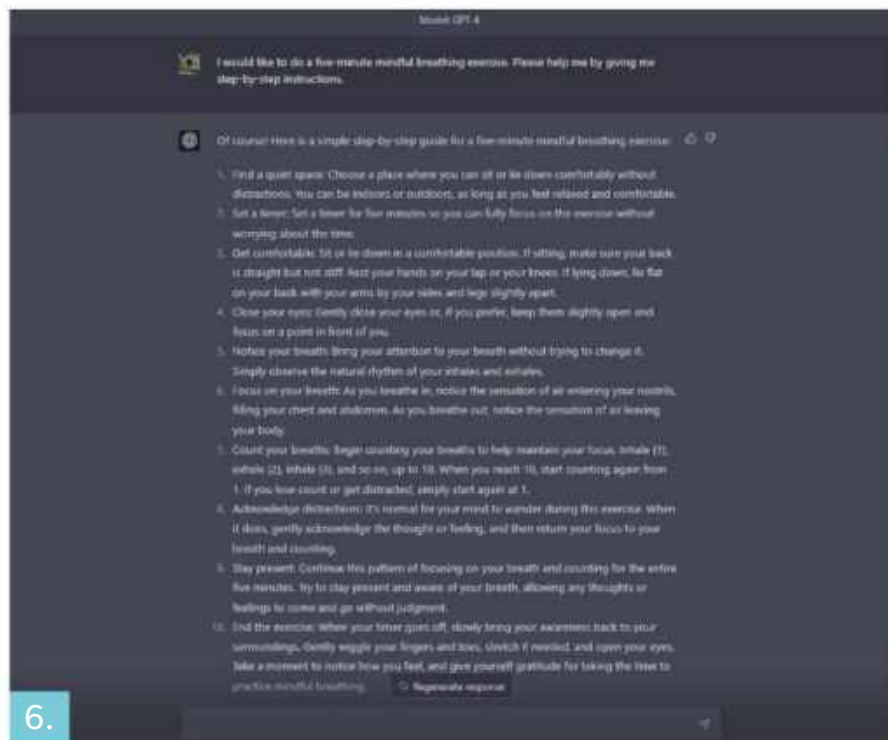
While ChatGPT can't directly compose music (fave.co/41c1MBI) or create audio files, it can help with various aspects of music composition like writing lyrics, suggesting chord progressions, or providing tips on song structure and arrangement. You can ask for guidance on specific musical concepts or brainstorm ideas for melodies or harmonies.



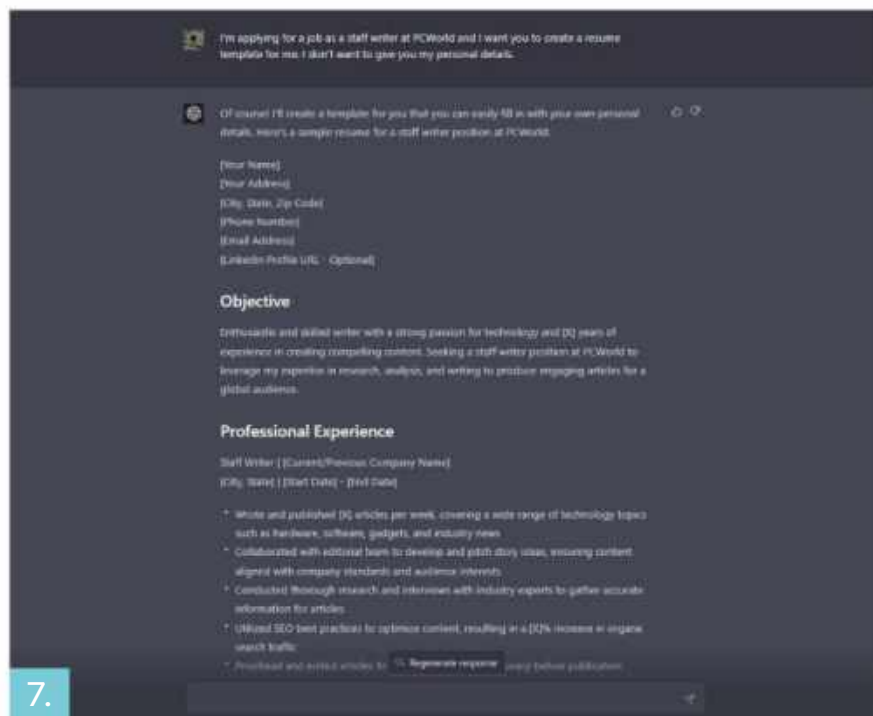
I asked ChatGPT to give me suggestions for a good chord progression for a jazz piece that I'm writing in E-flat minor. It then suggested the i—iv—VII7—III7—V7—i(9) chord progression, and encouraged me to experiment with chord extensions, substitutions, and alterations to add depth to the jazz piece.

6. GET HELP WITH MEDITATION AND MINDFULNESS EXERCISES

For those who like to meditate, ChatGPT can help guide you through mindfulness exercises by providing instructions and support. For example, if you want to do a



five-minute mindful breathing exercise, ChatGPT will give you detailed step-by-step instructions on what to do.

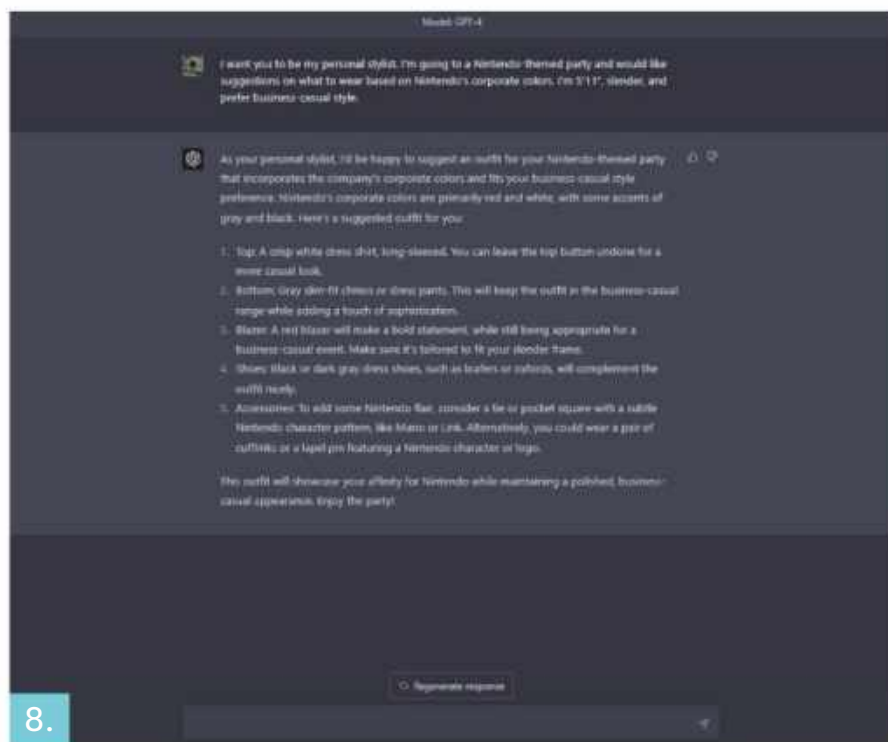


If you want to try a different type of meditation or mindfulness exercise, but aren't sure what to do, you can always ask ChatGPT to give you some suggestions.

7. CRAFT A RESUME

There are many resume builders (fave.co/43vQF8b) out there, but ChatGPT can provide guidance, suggestions, and tips for content and formatting if you want to create your resume yourself. You'll need to provide information about your work experience, education, skills, achievements, and other relevant details that you'd like it to include.

If you're not comfortable doing that, you can ask ChatGPT to give you a resume template for the job you are applying for. I told it that I was applying for a job as a staff writer at PCWorld but I didn't want to give it my personal information, and it made a decent resume template for me. All I would need to do later would be to fill in the blanks.



8. GET A PERSONAL STYLIST

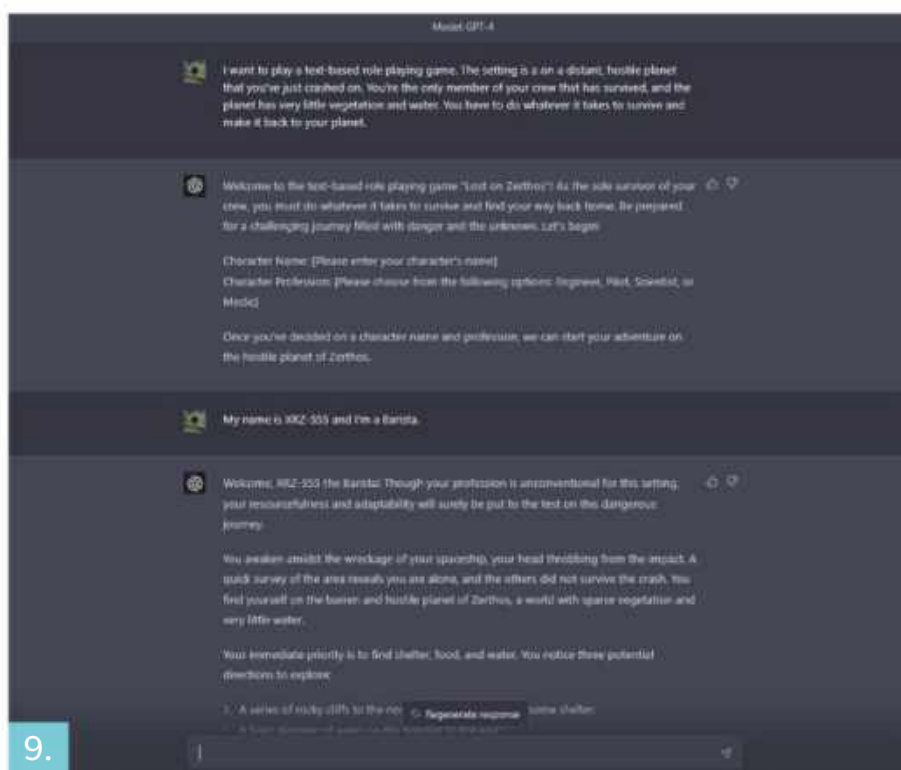
AI hasn't made it to the point where it can physically style someone, but it can offer fashion advice by suggesting outfit ideas, color combinations, accessorizing, and more. It can also give you tips on what outfits to wear for specific occasions.

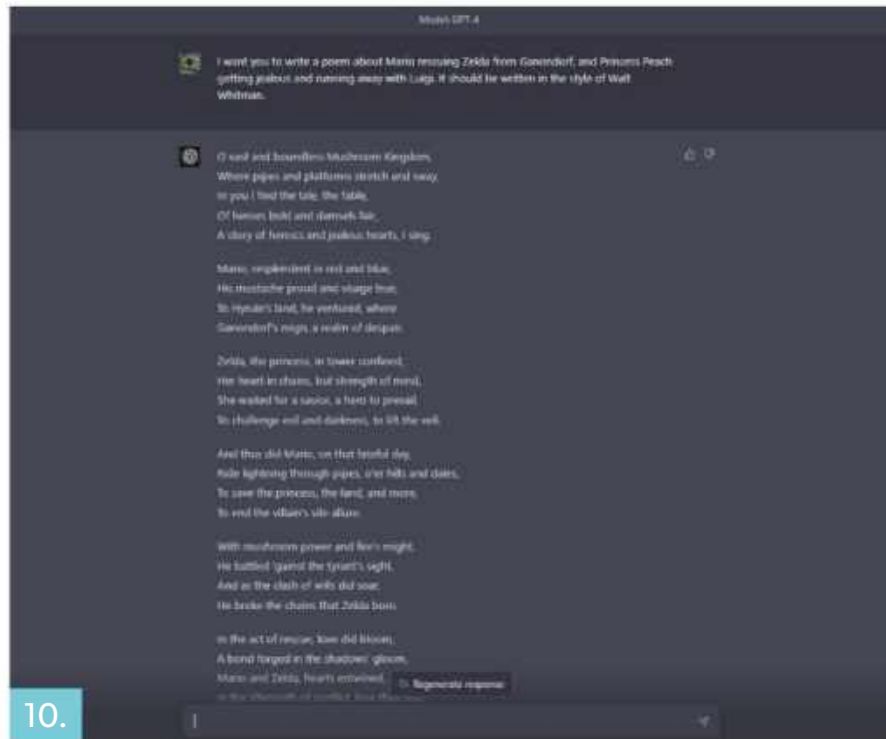
You'll need to share some personal details with it, like your style preferences, body type, what the occasion is, or other specific requirements you may have. I told ChatGPT that I was going to

a Nintendo-themed party and needed suggestions for a business-casual style that incorporated Nintendo's corporate colors. Its results were very detailed.

9. PLAY A TEXT-BASED RPG

ChatGPT can create text-based role-playing games that you can play (fave.co/41qz13K) by responding to the given prompts and making choices based on the scenario. You can leave it up to ChatGPT to create the setting of the game or you can give it a detailed explanation yourself.





I told ChatGPT that I wanted to play a text-based role-playing game set on a distant, hostile planet I've just crashed on. I'm the only surviving member of the crew, and the planet has very little vegetation and water. The goal is to survive and make it back to my planet. ChatGPT didn't fail to deliver.

10. WRITE POETRY

ChatGPT can write poetry in various styles and themes. Give ChatGPT the basic information it needs to create the poem, like a topic, style, desired mood, or anything else you think is relevant. It will then generate a poem based on that information.

I asked ChatGPT to write a poem about Mario rescuing Zelda from Ganondorf, and Princess Peach getting jealous and running

away with Luigi. I told it that it should be written in the style of Walt Whitman, who is generally considered the father of free verse. It generated a fantastic poem and then turned that into a haiku when asked.

WHAT'S NEXT?

ChatGPT has opened up a world of possibilities for users seeking assistance, entertainment, or creative inspiration. Its versatility in handling a diverse range of

tasks—from generating recipes and workout plans to crafting resumes and composing poetry—demonstrates the power of AI in enhancing our everyday lives.

As technology continues to evolve, we can expect even more innovative applications of ChatGPT and similar AI models. The future of AI-powered assistance is bright, and we are only beginning to scratch the surface of its potential to revolutionize the way we interact with the digital world.

If you want to see how you can use machine learning to bring your wildest dreams to life, be sure to check out our guide to the 10 best AI art generators that can create (almost) anything you ask for (fave.co/40aXZTV). 🔌



FEMA



PROTECT YOUR LEGACY PLAN FOR EMERGENCIES TODAY

VISIT [READY.GOV/PLAN](https://www.ready.gov/plan)

MAKE

A family
communications plan

SIGN UP

For local weather
& emergency alerts

PREPARE

An emergency kit





11 MUST-HAVE TOOLS

EVERY TECHIE SHOULD OWN

SOLVE COMMON TECH PROBLEMS BY KEEPING THESE HARDWARE TOOLS HANDY.
BY JARED NEWMAN

Some of my favorite tech tools are the ones I don't use on a daily basis. I don't pry open my laptop too often, for instance, but I'm glad to have the right tools at hand when the need arises. The same goes with various adapters, extension cords, cables, and battery backups.

In the same way you might have a toolbox for handiwork, you might consider keeping a tech toolkit for maintaining, fixing, or improving your gadgets. That way, you don't have to run off to an electronics store or wait for an Amazon order to arrive in your time of need.

Here are seven tech tools I'm always happy to have at my disposal.

1. GADGET REPAIR KIT

For less than \$20 on Amazon (fave.co/3UEOACY), you can buy a small screwdriver with dozens of attachable bits, capable of fitting practically any screw you'll come across on consumer electronics. Many of these kits also come with plastic picks and pry tools for pulling gadgets apart.

When a button on my Nintendo Switch controller failed, for instance, the repair kit allowed me to open it up. I've also used the pry tools to replace the battery on an old Chromebook (fave.co/3A1Aodq), and I've inspected the innards of several laptops while reviewing them for PCWorld (fave.co/3qL4oHf). And when the battery on my Lenovo

laptop starts to run down, I know its T5 Torx screws won't be able to keep me out. The repair kit is an indispensable tool for any gadget that isn't held together with glue. (For that, you'll need a heat gun, fave.co/3mwlasR.)

You might also consider a pricier kit (fave.co/40dEQjY) with small tweezers, pliers, and a wire stripper if you don't have those on hand already.

2. CANNED AIR

If you own a computer of any kind, I guarantee that it will benefit from an occasional blast



1.

of compressed air. Its internal fans inevitably suck up dust over time, hurting both performance and battery life as they have to work harder to keep the system. Buy a can (or three, fave.co/3mHfQE1) and give the vents a blast. Better yet, open up your computer (perhaps with the repair kit above) for a more thorough air dusting.

Want a fancier option that's less prone to unintentional misuse? Consider an electric air duster instead (fave.co/3mrranW).



2.



3.

3. USB-A TO ETHERNET ADAPTER

For less than \$15 (fave.co/3KXP2J9), these are increasingly helpful in a world where laptops seldom ship with their own Ethernet jacks.

Use the hardwired connection to troubleshoot home internet problems (fave.co/3WzdEdZ) or to get the best internet speeds possible. (Just make sure whatever adapter you buy supports at least the same maximum speed as your internet connection.)



4.

4. USB-A TO SD CARD

SD card slots are fast disappearing from plenty of newer laptops as well. I'm always thankful to have an adapter handy (fave.co/40bcNBU) for various Raspberry Pi projects (fave.co/3oi5JWD) and for loading content from my PC onto my Steam Deck (fave.co/3MHHL1c).

5. USB-A TO USB-C

At some point, you'll inevitably need to connect a USB accessory to a new device that lacks USB-A ports. Keep a couple of these adapters handy (fave.co/3Kxqc1g) for just such an occasion.



5.



6.

6. USB-C TO HDMI

This comes in handy (fave.co/3URsOMp) for connecting newer laptops to external monitors or TVs in a pinch, without requiring any other clunky adapters.

7. JUST ONE BIG USB-C HUB

Though it's sometimes nice to have individual adapters that don't take up much space, these days you can also just buy a single hub (fave.co/3zZHK1d) for all the adapters I just mentioned. Think of it as the Swiss Army Knife of connectivity. If you want more options, check out PCWorld's roundup of the best USB-C hubs and dongles (fave.co/30z4JBG).



7.



8.

8. USB EXTENSION CABLE

You keep an extension cord handy for plugging in faraway electronics, right? Why not do the same for your USB-powered devices? I have a few of these 10-foot USB extenders (fave.co/41tY2Ly), which I use to recharge my console game controllers from the couch and run a spare USB port from my desktop computer to the keyboard tray under my desk.



9.

9. 3.5MM AUDIO CABLE

An unsung hero of the gadget world, the 3.5mm audio cable (fave.co/3L0vmUY) is great to have in your bag when you find

yourself inside a rental car with nothing but auxiliary input, or when your Bluetooth headphones run out of battery. It's still the most foolproof way to route audio from one device to another (though the demise of smartphone headphone jacks means you'll probably want a USB-C or Lightning adapter on hand as well.)

10. PORTABLE POWER BANK

Extra battery life is always helpful to have, and the Charmast power bank (fave.co/3Kv3gQ4) I bought in late 2017 is still a workhorse today. It's large enough to charge an iPhone or iPad several times over, and its array of ports (USB-A, USB-C, micro-USB, Lightning) means I seldom have to go hunting for the right cable.

I'm not saying you need this particular power bank—you might want a more pocket-friendly one (fave.co/3SHUmlI) or a



much larger power station (fave.co/3mzHnHz)—but having some way to untether your devices from a power outlet is a wonderful luxury.

11. THE HUMBLE PAPERCLIP

Last but not least, a thin paperclip can get you out of more tech jams than you might think. Phone's not charging? You may just need to dislodge some lint. Need to switch phones in a pinch? Use a paperclip to eject

the SIM tray and move the card to another phone. Need to factory-reset a router, game controller, or remote control? You might need that paperclip to push the reset button. I've always got a few loose paperclips in my gadget drawer for just such occasions. 🔌

MADDY TURNED HATE

Maddy Park
Founder,
@CafeMaddyCab

INTO HOPE

AND STARTED A MOVEMENT

In 2021, the rise of violence against the Asian community made even the simple act of taking public transportation unsafe. So, Maddy started a fund to pay for cab rides for those in the Asian community that needed it most, including women, the elderly, and the LGBTQ+ community. With over \$100,000 raised in just two days, she started a movement based on love that lives on today.

love
has
no
labels



Join Maddy's cause and get the tools
to support the Asian community now at
LoveHasNoLabels.com



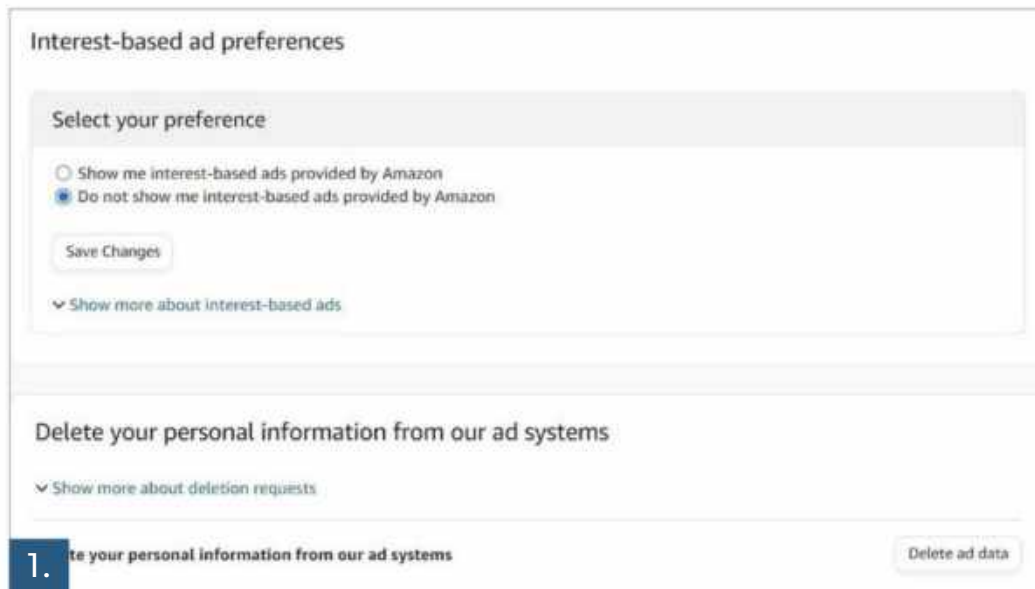
4 Amazon privacy settings you should change right now

Follow these links to minimize data collection and opt out of ad targeting. **BY JARED NEWMAN**

Like most big tech companies, Amazon collects large amounts of data on its users, in part for the purpose of targeting ads and training its Alexa voice models.

Look in the right places, though, and you can minimize or prevent much of this data

collection, or even opt out of Amazon's targeted ads entirely. If you're an Amazon customer in any capacity, it's worth taking a minute to sweep through the company's labyrinthine privacy menus and put some limits on the powers of its vast data collection apparatus.



on the site from creepily following you around the web.

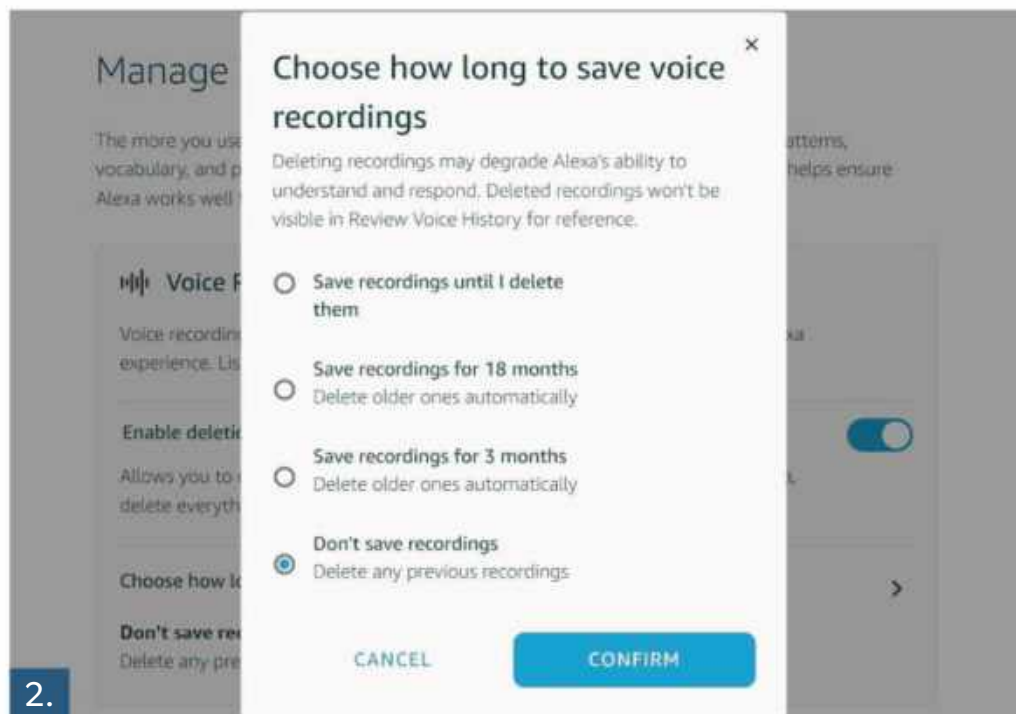
While here, you can also click the “Delete ad data” button to remove existing information from Amazon’s ad systems.

1. OPT OUT OF AMAZON’S TARGETED ADS

First, visit Amazon’s Advertising Preferences page (fave.co/3GHUBbW) and select “Do not show me interest-based ads provided by Amazon.” This will prevent the items you buy

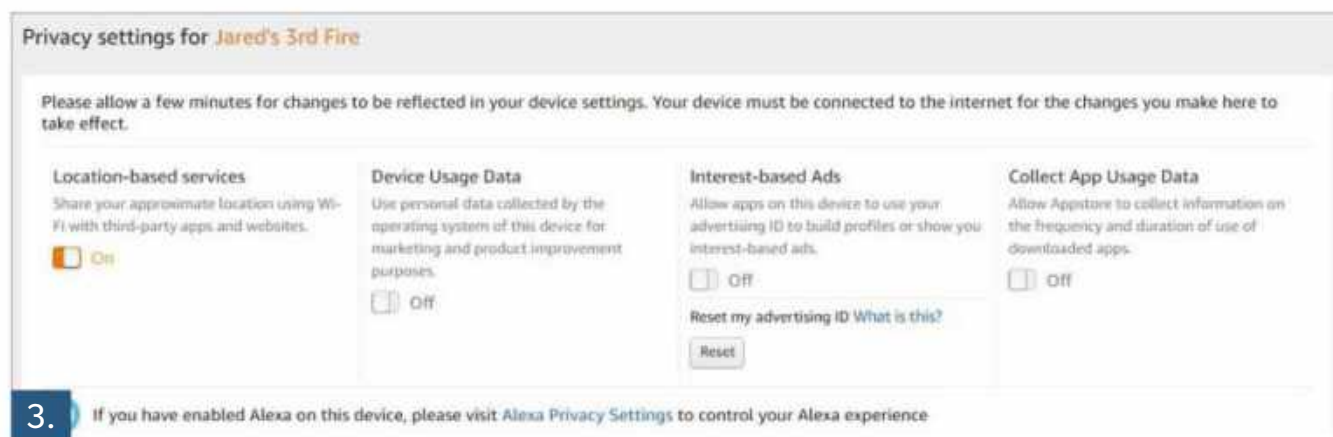
2. LIMIT ALEXA DATA COLLECTION

If you use an Amazon Echo speaker or other Alexa device, swing by Amazon’s Alexa privacy page (fave.co/409dWKb) and make the following adjustments:



- Under Voice Recordings, click the arrow next to “Choose how long to save,” then select “Don’t save recordings.” This stops Amazon from storing the audio of your voice commands.

- Under Smart Home Device History, click the arrow next to



“Choose how long to save,” then select three months, the minimum time frame available.


- Repeat the same steps for Detected Sounds History.
- Under “Help improve Alexa,” turn off both “Use of voice recordings” and “Use messages to improve transcriptions.”

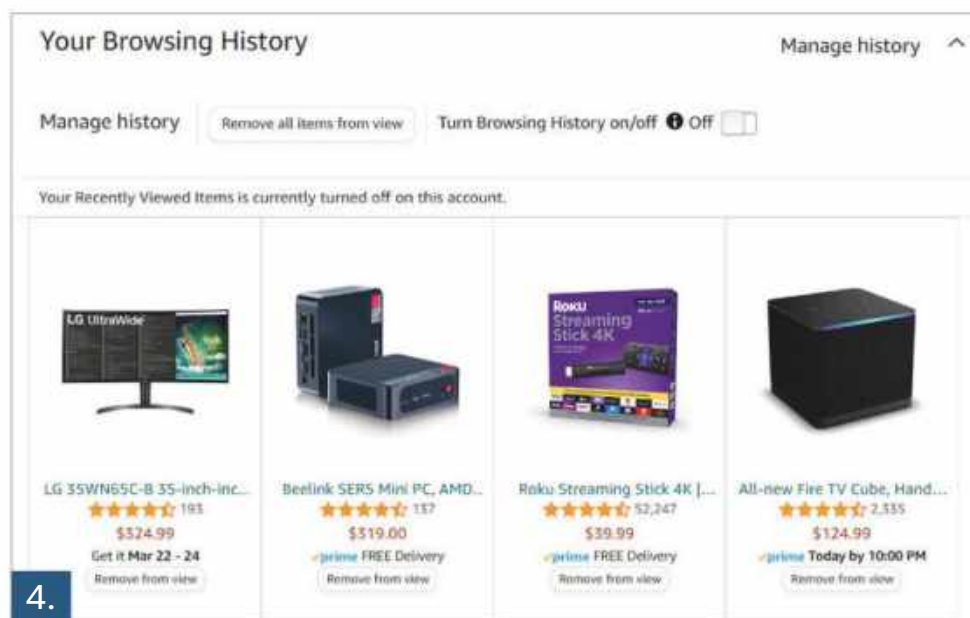
3. MINIMIZE AMAZON DEVICE DATA COLLECTION

If you have any Fire tablets or Kindle e-readers, you should also head to Amazon’s Devices Privacy page (fave.co/3GKxuOh). Select your device, then disable Device Usage Data, Interest-Based ads, and Collect App Usage Data. You’ll have to repeat this process for each device on the list.

4. HIDE YOUR AMAZON BROWSING HISTORY

Finally, consider turning off Amazon browsing history on a shared computer if you don’t want other folks seeing what you looked for.

Head to Amazon’s Browsing History page (fave.co/3MHMbFk), click the down arrow next to Manage History, then toggle Turn Browsing History on/off. 



Organize your Gmail inbox like a pro with these hidden icons

Why settle for one type of star when you can have 12? **BY ALAINA YEE**

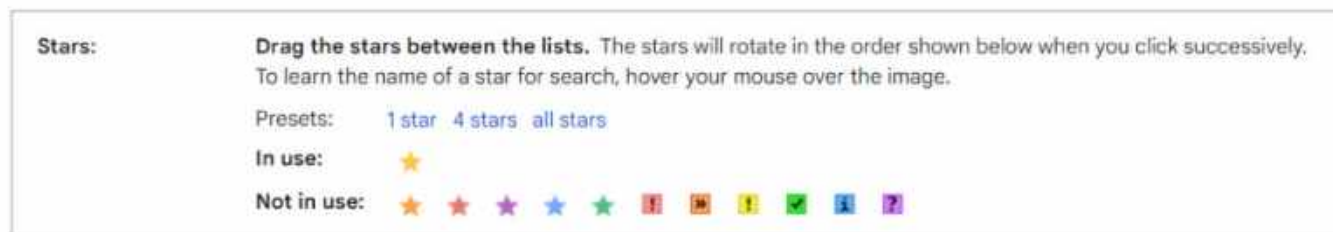


Look at the left side of your row of email in Gmail. See the star there? You can click on it to track different messages—things you want to follow up on, remember for later, or otherwise find quickly.

If you've used it before, you likely only know it as a yellow star that you can toggle on

and off. But did you know that other colors exist too, as well as other icon shapes that include different-colored exclamation marks, a checkmark, and a question mark?

To expand your lineup of star types, click on Gmail's gear icon, then choose See all settings. Under General, scroll down to Stars. By default, the "1 star" option will be



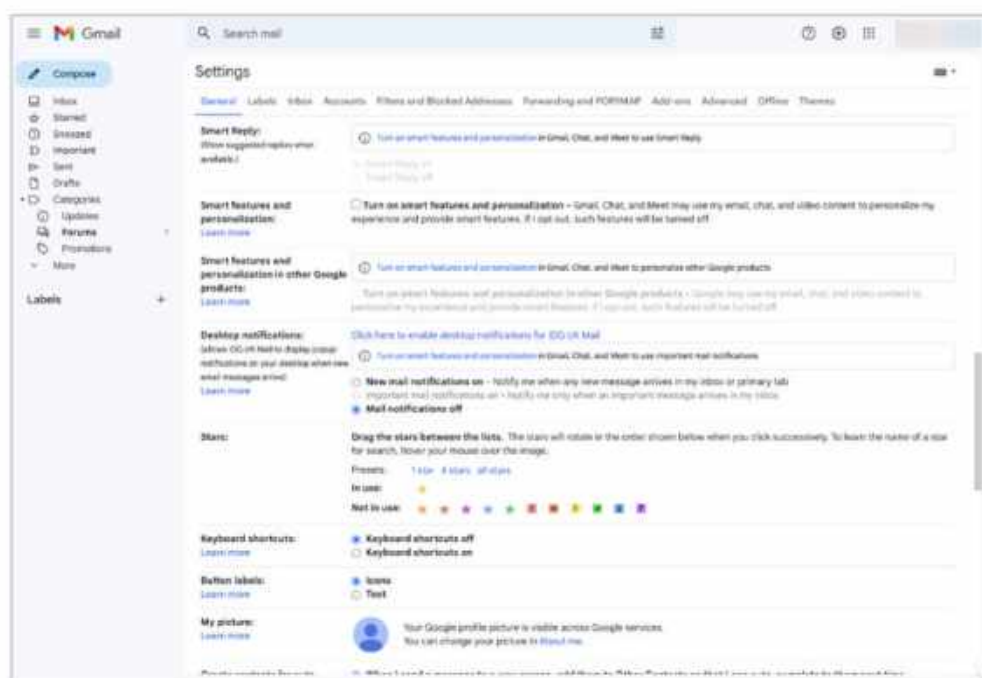
The red and yellow exclamation marks are very useful.

selected, but you can instead choose the option for “4 stars” (yellow and blue stars, green checkmark, and red exclamation mark) or “all stars” (six colored stars, plus a variety of six additional icons). After you pick the 4 stars or all stars option, keep clicking when starring an email to cycle through the set.

This is one of my longtime favorite features in Gmail—I’ve used it daily since I discovered it well over a decade ago, back when it was part of Google Labs’ experimental add-ons (RIP). Fortunately, it graduated to official integration into Gmail and survived the reaper. I use it to more distinctly flag items for my mental to-do list, separating out what’s high priority, what requires follow-up, and potential reference material. You can search for email tagged with a specific star type (fave.co/3ohn7uU),

which is helpful when you’re seeking specific groups of email.

There are other ways to get more out of Gmail, of course, so it’s worth learning other tricks, like how to change your display name (fave.co/40bxZra), how to block (and unblock) someone (fave.co/40qlrvr), and how to better search (fave.co/3MKT9cX) your email. But I find that this tiny feature can supercharge email sorting, especially when combined with Gmail’s filters and labels. 🔌



Click on Gmail’s gear icon, then choose “See all settings.” Under General, scroll down to Stars.



5 Windows 11 settings worth changing immediately

Changing these five settings makes Windows 11 much better in under five minutes of your time. **BY BRAD CHACOS**

While Windows 11 provides a fine enough out of the box experience—terrible new task bar aside—it handles so much better after tweaking just a few settings as to make it feel more like the Windows of yore.

No, I'm not talking about making Windows 11 look like Windows 10 (fave.co/3G1SpdZ) through an extensive overhaul (though if you're a Windows veteran, that's worth doing). I'm talking about fast, simple changes that improve the feel of the operating system, turn off annoying ads,

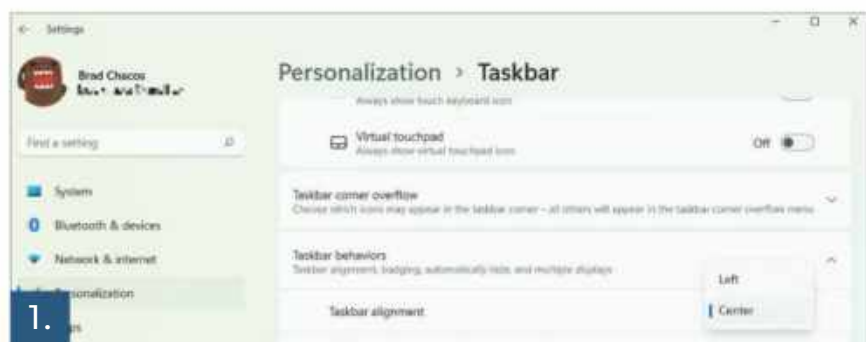
reduce the data you send to Microsoft, and more. Better yet, you can do them all in under five minutes—something I did mere weeks ago when I needed to pick up a Windows 11 laptop (fave.co/3qL4oHf) for some travel.

Here are five Windows 11 settings worth changing immediately, with an added bonus at the end.

1. MOVE THE START BUTTON TO THE LEFT CORNER

What can I say? I'm a traditionalist. I understand Microsoft's desire to revamp Windows 10's interface to more closely mirror the style of Macs and Chromebooks—legions of kids get schooled on those, after all—but Windows 11's shifting taskbar icons drive me batty. I want mousing over to the Start menu to be muscle memory, not yet another task I have to look at and mentally process.

Fortunately, Microsoft makes it easy to move the Start menu back to the

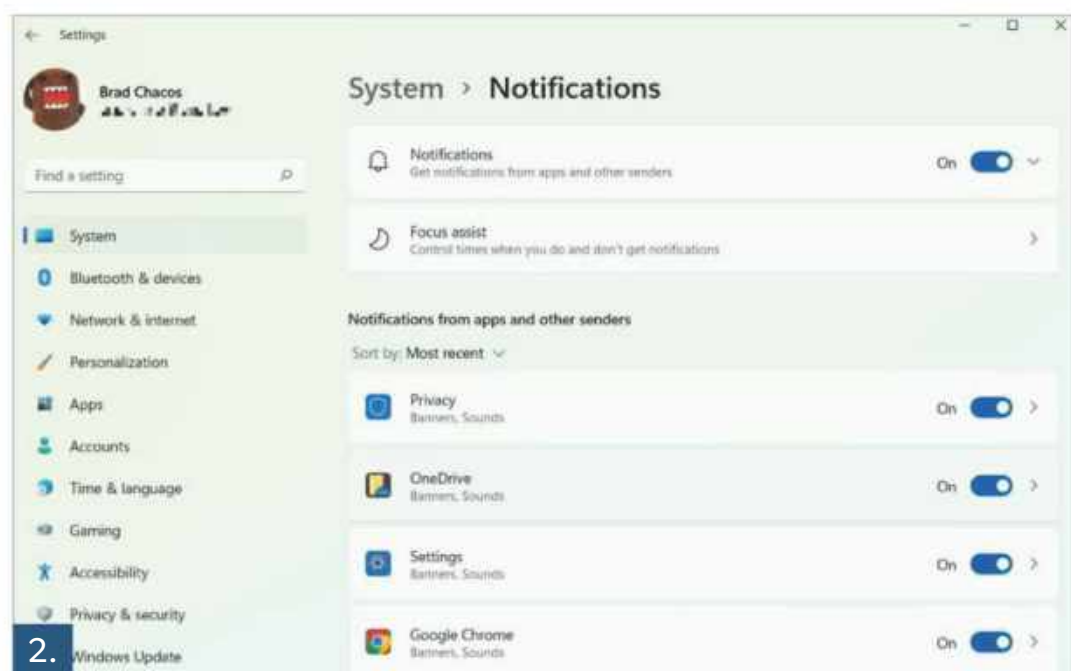


left-hand corner. Simply open the Start menu and head to Settings > Personalization > Taskbar > Taskbar behaviors. You'll see a field labeled **Taskbar alignment** with a drop-down menu. Change the drop-down option in the menu from Center to Left.

Boom! On to the next.

2. TURN OFF ANNOYING NOTIFICATIONS

Next, it's time to turn off those annoying pop-up notifications. Windows 11 itself



spawns some, but the worst offenders are third-party apps, especially if your laptop or desktop came

preloaded with bloatware. Making the distractions stop is simple.

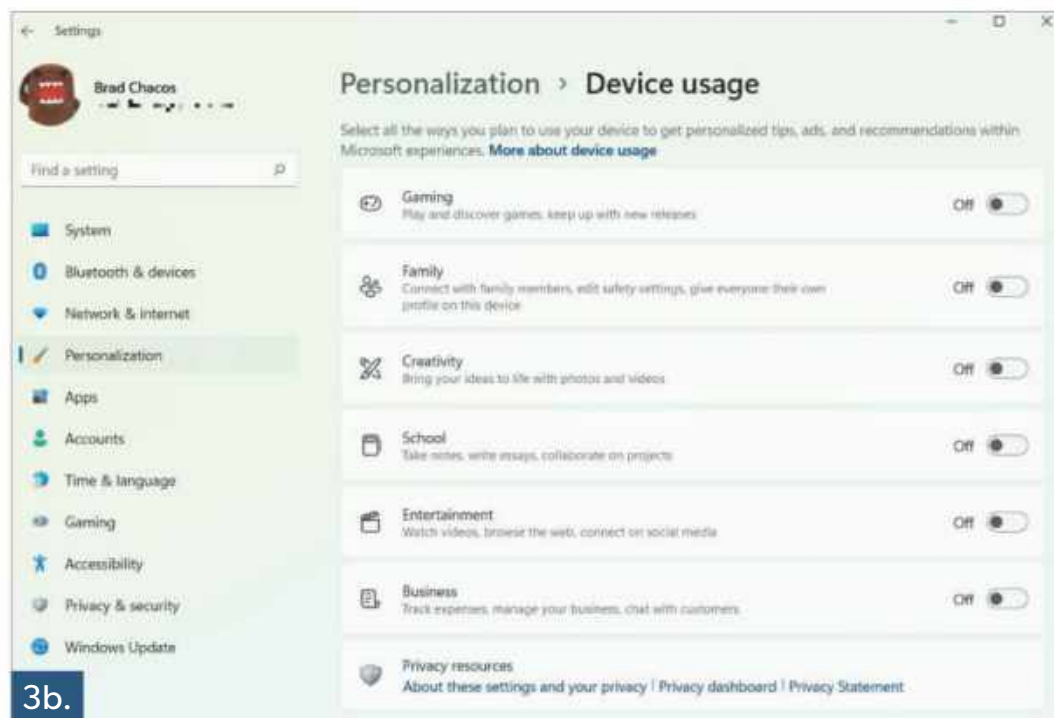
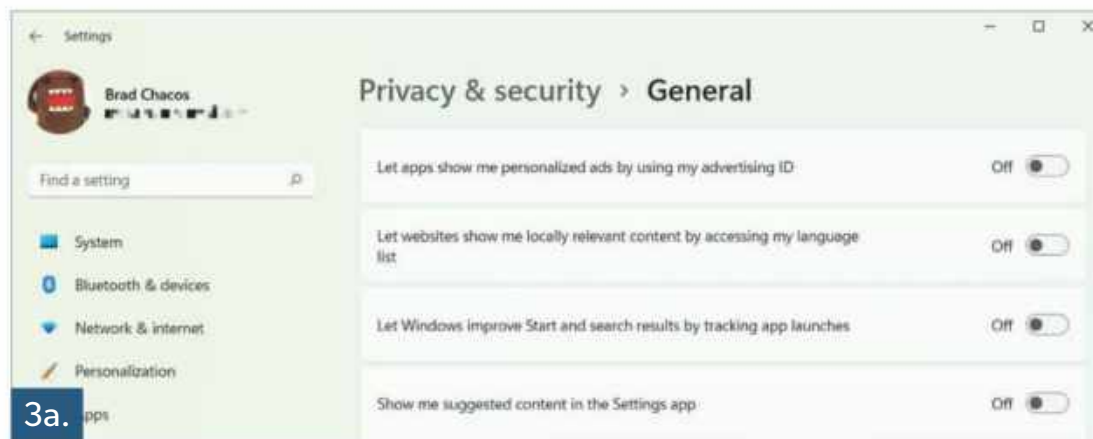
Head to Start > System > Notifications. You can turn notifications off universally if you desire. I prefer to work through the list manually, leaving notifications on for critical tools like Slack, Discord, and my antivirus software (fave.co/3CnDHuk). (If my AV scanner wants to shout about something, I

want to hear it!) Either way, this menu cures many headaches.

3. TURN OFF MICROSOFT ADVERTISEMENTS

That segues neatly into the next tip. Keep scrolling down beyond the bottom of the list of apps that can send you notifications. There you'll see a couple of additional

boxes that relate to Windows 11 itself providing "tips and suggestions" on how to use your PC. If you know your way around well enough, deselect "Offer suggestions on how I can set up my device" and

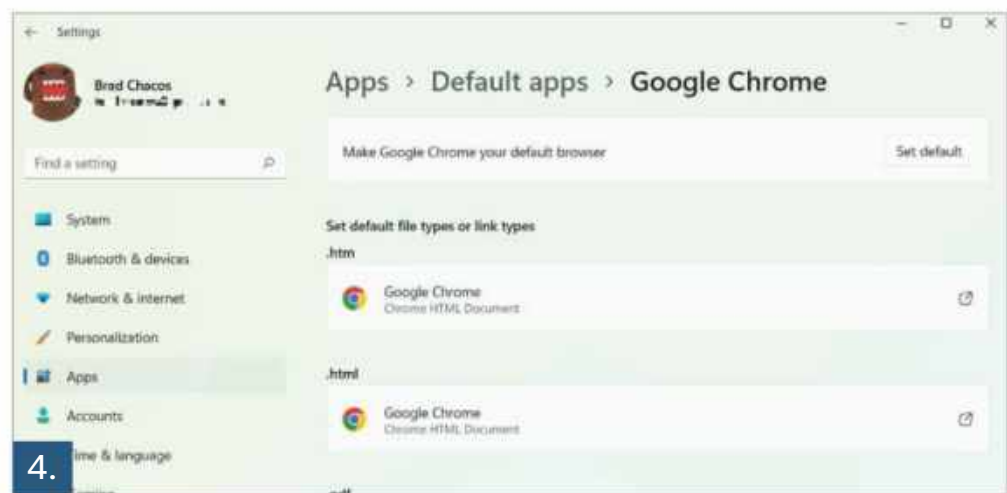


“Get tips and suggestions when I use Windows boxes.” I prefer to leave the “Show me the Windows welcome experience” option checked so I’m notified of new features when a big update drops.

We’re not done yet, though. If you don’t like seeing Microsoft promotions pop up in your Settings app, head to Start > Settings > Privacy & security > General (**3a**). Disabling “Show me suggested content in the Settings app” does the trick, though you may want to turn off all these options.

Finally, head to Settings > Personalization > Device usage (**3b**). The options here tell Microsoft how you use your computer so that Windows 11 can provide recommendations for apps, websites, Office 365 trials, and more that are tailored to you. Turn them all off if you’re not interested in your \$100-plus copy of Windows 11 upselling you on still more Microsoft services.

There are plenty of other places Microsoft promotions lurk, such as within the beautiful lock screens provided by Bing Images, but tweaking this handful of settings should eradicate the most irritating ones.



4. CHANGE YOUR DEFAULT BROWSER

Microsoft Edge is pretty darned good, actually, but if you’re a die-hard Chrome, Firefox, Opera, or Brave user, switching your default browser is easy (well, these days it is—fave.co/3GGTXf6).

After downloading and installing the browser of your choice, it should ask if you want to make it the default. Do so, duh. But if you missed your chance during setup, navigate to Settings > Apps > Default apps, find the name of your browser in the list, and click on it. A “Make <browser name> your default browser” banner with the “Set default” button at the top of the page does the trick.

5. DECLUTTER THE TASKBAR

Yep, Windows 11’s nerfed taskbar sucks, and Microsoft stuffs it to the brim with icons and features you probably have no interest in. Make it easier on the eyes and reclaim some space by heading to Settings >

Personalization > Taskbar and deselecting any of the taskbar items you'll never use. Adios, Widgets and Teams Chat.

While we're on the topic, spending \$5 on Stardock's Start11 ([fave.co/3Ooi0I4](https://www.stardock.com/products/start11/)) or StartIsBack ([fave.co/3ED7Use](https://www.startisback.com/)) is well worth it. The programs offer granular options that expand the look and functionality of the taskbar and Start menu alike, so it's a lot easier to make Windows 11 look like Windows 10 ([fave.co/3G1SpdZ](https://www.stardock.com/products/start11/)). They're beyond the scope of this article, but they still deserve a shout-out.

BONUS: DARK MODE, BABY!

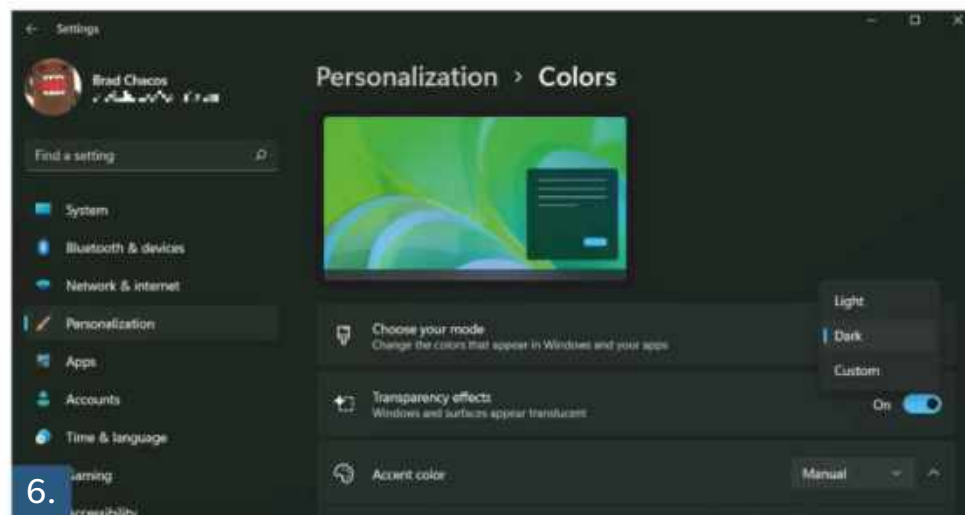
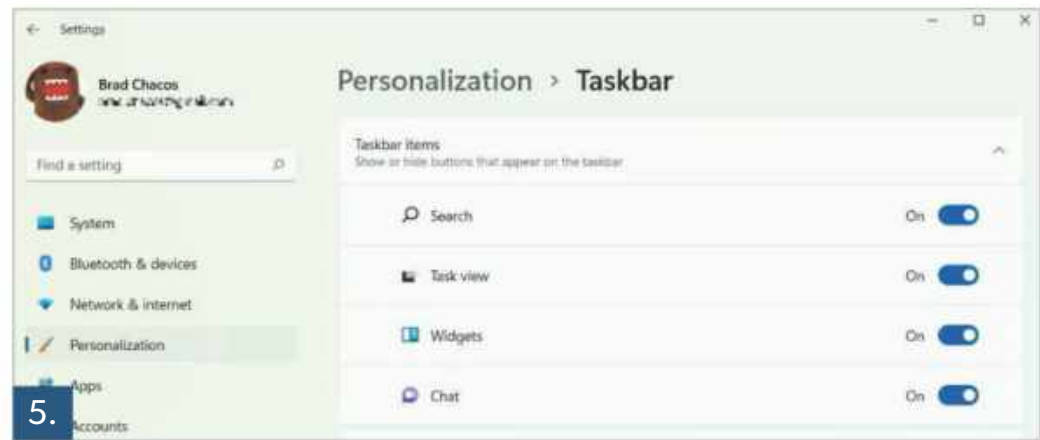
Finally, an optional personal preference: Some folks like staring at black text on white

screens all day. Others, like me, prefer not to sear their retinas. So the very first thing I always do with a new Windows install is activate dark mode, a preference that carries over into several apps once you've set it.

Head to Settings > Personalization > Colors and look for a field called "Choose your mode" (6). Change the drop-down menu from Light to Dark. Your eyes will thank you.

That's about it for this rundown of quick Windows 11 settings to change immediately. You can go as deep as you want, though. Check out our guides to 10 Windows 11 tips

and tricks we use to customize our PCs ([fave.co/3KIDacy](https://www.fave.co/3KIDacy)), 10 obscure Windows features that will blow your mind ([fave.co/3YIrl1H](https://www.fave.co/3YIrl1H)), and 7 frustrating Windows 11 annoyances as well as how to fix them ([fave.co/3MKARbu](https://www.fave.co/3MKARbu)). 🔌





**WHEN IT COMES TO
MAKING PLANS
YOU'RE THE BEST**

MAKE A PLAN
TO PROTECT YOU AND
YOUR LOVED ONES FROM
A NATURAL DISASTER

✓ **Sign up**
for local weather and
emergency alerts

✓ **Prepare**
an emergency kit

✓ **Make**
a family
communications plan

Get started at ready.gov/plan

Ready ✓



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A video showcase of the latest trends



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SFx_JMtxw8E](https://youtu.be/SFx_JMtxw8E)

Budget GPU Battle: RTX 3050 vs. RX 6650 XT vs. Arc A770!

→ GPU prices are falling! With recent sales we were able to pick up three graphics cards for under \$280: an Nvidia GeForce RTX 3050, AMD Radeon RX 6650 XT, and Intel Arc A770. Which sub-\$300 GPU is the best? And how does the 8GB variant of the A770 perform against the 16GB variant? You have to watch to find out!