Click Here

The calculator button is at the top of the page with the label TI 84 graphing calculator. This will open the TI 84 calculator.Step 3. Use the calculator.The calculator should appear on the screen and allow you to use.ConclusionIn conclusion, using a TI-84 calculator online for free is a convenient way to access powerful graphing and calculation tools without needing a physical device. By following the simple steps outlined, you can quickly open the calculator on TestNav and start solving equations, graphing functions, and tackling complex math problems. Whether you're a student needing a calculator for school or just someone interested in exploring advanced math, this online tool provides the functionality of a TI-84 calculator right from your computer. Give it a try and see how easy it is to start calculating! Facebook Twitter LinkedIn Pinterest Trustpilot Privacy Policy About us Contact us Terms & Services © 2024-2025 TI84OnlineCalculator | Built with ❤ and creativity. Notice: TI84OnlineCalculator is not affiliated with Texas Instruments Inc. For educational purposes only. Cemetech Resources: How Can We Help? Casio Prizm HP Prime TI-83 Plus TI-83 Plus Silver Edition TI-84 Plus TI-84 Plus C Silver Edition TI-84 Plus CE TI-84 Plus Silver Edition TI-89 TI-Nspire CX TI-Nspire CX CAS Arduino Raspberry Pi TI-Innovator Hub TI-Innovator Rover Resources for Programmers jsTIfied Online TI-83+/TI-84+ Emulator: A graphing calculator in your browser, emulating the TI-83 Plus and TI-84 Plus family. Built for programmers, with debugging tools, static and animated screenshot capabilities, and ability to transfer files to and from your computer. SourceCoder 3 Online TI-BASIC IDE: Write and test TI-BASIC, assembly, and C programs for the TI-83 Plus, TI-84 Plus, and Casio Prizm families of calculators in your browser. Test with the built-in emulator, then export files you can send to your calculator. Also can convert images from and to calculator picture files. Discussion Forum: Get help writing computer and calculator programs, or share your creations. Discuss STEM topics and questions. A few relevant sections: Your Projects: Share your projects, and ask for any help you need. Technology & Calculator Open Topic: Discuss everything related to graphing calculators. Calculator Hardware, Electronics, Robotics: Discuss electronics and hardware platforms and projects, including with microcontrollers, robots, Raspberry Pi, and Arduino. Computer & Mobile Programming: Get help with programming computers and mobile devices with C, C++, Python, Java, and any other language. Calculator Programming: Get help with programming calculators with TI-BASIC, z80 and ez80 Assembly, C, Lua, Python, Casio BASIC, and more. Calculator Programming: Get help with web programming and markup, such as Javascript, HTML, PHP, and CSS. IRC and Discord Chat: If you use IRC, find us at #cemetech on EfNet. Otherwise, consider our Discord. SAX Chat: Log in with a free account, and you can chat with us directly on this page. ↑ Back to Top Discussion Forum: Get help with using your calculator, and with math, science, coding, and engineering. A few relevant sections: Technology & Calculator Open Topic: Discuss everything related to graphing calculators. General Open Topic: Discuss everything related else, from math to science, and beyond. Calculator Hardware, Electronics, Robotics: Ask questions about (or show off projecs with) the TI-Innovator Hub, TI-Innovator Rover, Arduino, Raspberry Pi, and other electronics and hardware platforms and projects. Programming: Ask questions about programming calculator, mobile, web, and computer languages, like TI-BASIC, C/C++, Python, Java, Javascript, and beyond. IRC and Discord Chat: If you use IRC, find us at #cemetech on EfNet. Otherwise, consider our Discord. SAX Chat: Log in with a free account, and you can chat with us directly on this page. ↑ Back to Top jsTIfied Online TI-83+/TI-84+ Emulator: A graphing calculator in your browser, emulating the TI-83 Plus and TI-84 Plus family. Great for presenting calculator skills in class, writing programs on your computer, and taking screenshots to put in lessons. SourceCoder 3 Online TI-BASIC IDE: Write and test TI-BASIC, assembly, and C programs for the TI-83 Plus, TI-84 Plus, and Casio Prizm families of calculators in your browser. Test with the built-in emulator, then export files you can send to your calculator. Also can convert images from and to calculator picture files. Discussion Forum: Get help writing computer and calculator programs and creating math, science, and coding lesson plans. Discuss STEM topics and questions. A few relevant sections: Technology & Calculator Open Topic: Discuss everything related to graphing calculators. Calculator Hardware, Electronics, Robotics: Discuss questions and share solutions with the TI-Innovator Hub, TI-Innovator Rover, Arduino, Raspberry Pi, and other electronics and hardware platforms and projects. Computer & Mobile Programming: Ask questions about programming computers and mobile devices with C, C++, Python, Java, and any other language. Calculator Programming: Ask questions about programming calculators with TI-BASIC, z80 and ez80 Assembly, C, Lua, Python, Casio BASIC, and more. IRC and Discord Chat: If you use IRC, find us at #cemetech on EfNet. Otherwise, consider our Discord. SAX Chat: Log in with a free account, and you can chat with us directly on this page. ↑ Back to Top © Copyright 2000-2025 Cemetech & Christopher Mitchell :: Page Execution Time: 0.056076 seconds. The TI-83 series is a series of graphing calculators manufactured by Texas Instruments.The original TI-83 is itself an upgraded version of the TI-82. Released in 1996, it was one of the most popular graphing calculators for students. In addition to the functions present on normal scientific calculators, the TI-83 includes many features, including function graphing, polar/parametric/sequence graphing modes, statistics, trigonometric, and algebraic functions, along with many useful applications. Although it does not include as many calculus functions, applications and programs can be written on the calculator or loaded from external sources.The TI-83 was redesigned twice, first in 1999 and again in 2001. TI replaced the TI-83 with the TI-83 Plus in 1999. The 2001 redesign introduced a design very similar to the TI-73 and TI-83 Plus, eliminating the sloped screen that had been common on TI graphing calculators since the TI-81, and included Flash memory, enabling the device's operating system to be updated if needed, or for large new Flash Applications to be stored, accessible through a new Apps key. The Flash memory can also be used to store user programs and data. In 2001, the TI-83 Plus Silver Edition was released, which featured approximately nine times the available flash memory, and over twice the processing speed (15 MHz) of a standard TI-83 Plus, all in a translucent grey case inlaid with small "sparkles". The 2001 redesign (nicknamed the TI-83 "Parcus") introduced a slightly different shape to the calculator itself, eliminated the glossy grey screen border, and reduced cost by streamlining the printed circuit board to four units. Reviewer: pizza822242 - favoritefavoritefavoritefavoritefavoritefavorite - February 21, 2025 Subject: nice really usefull and emulates it to a t Reviewer: chloe2630 - February 15, 2024 Subject: For Those Who Can't Get it to Work Try clicking the on button at the bottom left of the calculator :) Reviewer: Yomna Ghorab - favoritefavoritefavoritefavoritefavorite - January 31, 2024 Subject: wpoi err r r Reviewer: Kiki Taylor - favorite - January 18, 2024 Subject: How does it work? I can't get it to work. Reviewer: Speedy11a - December 10, 2023 Subject: It does not work for me This thing does not seem to work for me it does nothing so I will not rate this as this may be my fault. Reviewer: HappySwordsman - favoritefavoritefavoritefavorite - August 27, 2023 Subject: Wow Not quite sure how I ended up here, but I am glad I did. Totally unexpected, but neato. Reviewer: JT45 - favoritefavoritefavoritefavorite - January 31, 2023 Subject: Amazing Emulation I compared this Emulator side by side with my TI83. The colors are spot on and feels similar to the real calculator. The only difference I could find was ... that the contrast control does not work in the emulator. There are 7 reviews for this item. . The TI-84 Plus and TI-84 Plus CE are two of the most popular calculators used in schools and universities for graphing, algebra, calculus, and more. But not everyone has access to these expensive devices at all times. That’s where our online TI-84 calculator comes in handy. It's available 24/7, requires no installation, and is 100% free. Key Features Graphing Capabilities: Plot functions, graphs, and equations with ease. Scientific Functions: Solve algebraic expressions, calculus problems, and more. TI-84 Plus & CE Compatibility: Our simulator mimics the experience of using both the TI-84 Plus and TI-84 Plus CE models. No Downloads or Installs: Use the calculator directly from your browser without any downloads. Free and Accessible: Completely free to use for students, teachers, and professionals. How to Use the TI 84 Calculator Online Using our online TI 84 calculator is simple. Just navigate to our homepage and start using the calculator right away. You don’t need to sign up or log in. The interface is intuitive, and the functionality mirrors that of a physical TI-84 calculator, so if you've used one before, you'll feel right at home. Step-by-Step Instructions: Open the calculator on our website. Enter your equations or expressions using the keypad. Use the graphing feature to plot functions or visualize data. Explore advanced features for solving calculus or algebra problems. Who Can Benefit from This Online TI 84 Calculator? Students: Whether you're in high school or college, this tool is perfect for math, science, and engineering courses. Teachers: Use the TI-84 online in classrooms for demonstrations or during virtual learning sessions. Professionals: Engineers, data analysts, and other professionals who need a reliable graphing calculator on the go will find this tool incredibly useful. FAQ: Common Questions About Our TI 84 Calculator Online Is the online TI 84 calculator free? Yes, our TI 84 calculator online is completely free to use with no hidden fees or subscriptions. Does it work like a real TI-84 Plus calculator? Yes, our simulator is designed to mimic the real TI-84 Plus and TI-84 Plus CE calculators, providing a similar user experience. Can I use this calculator on mobile devices? Absolutely! Our calculator is optimized for both desktop and mobile browsers, so you can use it on the go. Conclusion Our TI 84 calculator online offers a free, easy-to-use solution for anyone in need of a powerful graphing calculator. Whether you're solving algebra problems, plotting graphs, or working on calculus, this tool has you covered. Visit our website today and start using the TI-84 Plus and TI-84 Plus CE simulator for free! Start calculating now at ti84calc.com (opens in a new tab). jsTIfied is a free online graphing calculator emulator in your browser. Bugs/questions/comments? Post in the Cemetech thread and discuss away! Load a ROM image toactivate jsTIfied. Drop file here toload into RAM. Drop file here toload into Archive. jsTIfied is an online TI-73, TI-76.fr, TI-81, TI-82, TI-82 Stats.fr, TI-83, TI-83+, TI-83+SE, TI-84+, and TI-84+SE emulator written in JS/HTML5. It is an exact functioning replica of a real graphing calculator, so you can use it for math, graphing, statistics, programming, and more. [How it works] Please register or log in to access jsTIfied's full features. Once you log in, you will be able to export files, take screenshots, and transfer programs to and from SourceCoder 3, Cemetech's online TI-BASIC IDE. Whether logged in or not, your virtual calculator's ROM and RAM are stored entirely in your browser, so you can maintain a persistent calculator without worrying about the privacy of your data or legal concerns. Please register and log in to Cemetech to take screenshots. Because screenshot data must be bounced through the Cemetech server due to Javascript limitations, we require registration to mitigate abuse. Error: Invalid ROM file; must end in .rom or .ROM. On iOS devices, may end in .jpg or .JPG. See "Export Calculator ROM Image" below for more information. jsTIfied needs a ROM image to function. Please note that this is only stored in your local browser and is never sent out over the internet in any form, especially not to any Cemetech servers or storage. This must be a TI-73, TI-76.fr, TI-81, TI-82, TI-82 Stats.fr, TI-83, TI-83 Plus, TI-83 Plus Silver Edition, TI-84 Plus, TI-84 Plus Silver Edition, or TI-84 Plus C Silver Edition ROM image. Note: in most countries, it is illegal to share or download ROM images for devices you do not own. From most devices, you should upload a *.rom file. If you are on an iOS6+ device like an iPad, iPhone, or iPod Touch, you must use the Export Calculator ROM Image tool below from a computer to export your ROM encoded in a JPEG image. You can then upload that image as a ROM from your iOS device. Limitations of Apple iPad, iPhone, and iPod Touch devices mean you cannot load *.rom files to jsTIfied from those devices. To use this graphing calculator emulator on your Apple device, follow these steps: From a computer, upload your *.rom image to jsTIfied From the same computer, click this: Create JPEG-encoded ROM image. Right-click the black-and-white square image that appears, choose "Save As...", and save it to your computer as *.jpg. Use iTunes or iCloud to get the .jpg image onto your iOS 6+ device. Alternatively, email yourself this image, then download it directly from your Apple device, or use the Dropbox App. Caution: Some very large images sent via iTunes or iCloud will result in the image being resized and corrupted! If jsTIfied seems unable to load your JPEG-formatted ROM, try emailing it to yourself instead of using iTunes/iCloud. Open jsTIfied on your Apple device and upload the JPEG in the "Import Calculator ROM Image" section above. Voila! JPEG ROM (data bytes) Right-click on this image and save it as anything.jpg. You can then load it onto your iPad, iPhone, or iPod Touch to use it as a jsTIfied ROM image. I'm curious how this works. Can you explain? Happily! Read how jsTIfied works: learn the nitty-gritty of how jsTIfied was designed and constructed. This emulator won't work! jsTIfied complains about Javascript being disabled, or displays error messages about missing Javascript features. How do I fix it? Make sure Javascript is enabled. If that's not the issue. some browsers don't offer all of the Javascript features jsTIfied needs in order to work. Most versions of Firefox, Chrome, Opera will work. Internet Explorer versions IE10 and higher, and Safari 6 and higher also work. Many mobile browsers will not run jsTIfied properly. Why do I need a ROM image to use this? A ROM image is the software (operating system) that is on your calculator, the way Windows or Mac OS X is the operating system on your computer. jsTIfied just emulates the calculator's hardware, so you need to load the ROM image from your real calculator to make jsTIfied work.Where can I download a ROM image? Your calculator's software has a unique area called the certificate; it is illegal to share ROMs (otherwise jsTIfied would come with the ROM already installed and save you work!). You must use something like Rom8x to dump the ROM image off of your calculator. Cemetech does not recommend downloading ROM images from the internet, because as previously stated, it is illegal for sites to be distributing ROMs. Although Cemetech does not provide support, members have reported that the WabbitEmu emulator can generate .ROM images from .8xu OSes provided by Texas Instruments. The legality of this approach is contested; please contact the WabbitEmu developers for support and details. What calculators does jsTIfied support? jsTIfied emulates the TI-83 Plus, TI-83 Plus Silver Edition, TI-84 Plus, and TI-84 Plus Silver Edition. It also supports the TI-82, TI-83 (non-Plus), TI-73, TI-81, TI-76.fr, and TI-82 Stats.fr; future support for the TI-84 Plus C Silver Edition is planned. It will never support the TI-89, TI-92, Voyage 200, or TI-Nspire calculators, which run on completely different hardware. Why is jsTIfied running so slowly on my computer? jsTIfied is operating at the very edge of current computing technology's capabilities, both hardware and software wise. It uses plenty of tricks to run as fast as possible, and a great deal of effort and testing time was spent making it perform optimally in popular browsers. However, emulation carries a significant performance penalty even in compiled languages like C++, and Javascript brings the extra slowdown of an interpreted language plus the rendering overhead of a complex modern browser. Once more optimized Javascript engines and faster hardware are available, jsTIfied will be automatically faster. Unfortunately, by that time we'll have faster calculators that it will need to emulate. I still need help. That's not really a question, is it? Post a topic on the Cemetech forum and our helpful members will try to assist you. jsTIfied follows the PindurTI key mapping convention. PC key / actionCalculator key Click on LCD[ON] [A] to [Z] the button that yields the corresponding letter if alpha is on, see below [space][0] Arrow keysArrow keys [0] to [9], [ENTER], [.], [,]Corresponding key [+][-][/][*] on the Number Pad[+][-][/][*] [( ]) [F1] [Y=] [F2][WINDOW] [F3][ZOOM] [F4][TRACE] [F5][GRAPH] [ESC][MODE] [SHIFT] or [~][2nd] [CTRL][ALPHA] [/][CLEAR] [-][(-)] [=][XTθn] [PG UP] or [B][APPS] [PG DN] or [C][PRGM] [INS][VARS] [DEL][DEL] [HOME][MATH] [END][STAT] [A][MATH][B][MATRX][C][PRGM] [D][x-1][E][SIN][F][COS][G][TAN][H][^] [I][x2][J][,][K][(][L][)][M][÷] [N] [LOG][O][7][P][8][Q][9][R][×] [S][LN][T][4][U][5][V][6][W][-] [X][Sto>][Y][1][Z][2] By using this emulator, you agree to the following terms of service. You agree to use this emulator for good, for the development of positive and constructive software. You acknowledge that this emulator stores all calculator information client-side, in your browser, and never transfers the ROM image of the calculator in whole or in part to or from Cemetech's servers and hardware. Cemetech does not host any ROM images; you must dump a legitimate ROM from your calculator to use this tool. SourceCoder integration allows you to choose to transfer files you have written on it to Cemetech for sharing and editing, but only user-written programs and files will be transferrable. Due to technical limitations of Javascript, data in screenshots and exported programs only must be bounced through the Cemetech web server. The data is not cached or stored in any way, but if you wish to keep your calculator's data entirely in your browser, do not use those features. You acknowledge that this tool is provided for free personal, educational, and non-commercial use. No fitness or stability guarantees are provided, and data may be lost without warning. Cemetech reserves the right to suspend access to this tool at any time. Abuse of this tool may cause individuals or organizations to be blocked from access. The code and images used to create the jsTIfied tool are either the sole intellectual property of Cemetech / Christopher Mitchell or by other authors/artists and used with permission. You may not reproduce the jsTIfied tool in whole or in part, reverse engineer it, or attempt to host it on your own website, especially (but not exclusively) for profit, without express written consent from Cemetech / Christopher Mitchell. Please register and log in to Cemetech to link jsTIfied with SourceCoder. SourceCoder projects are associated with individual user accounts, so you must be logged in to access SourceCoder projects. © Copyright 2000-2025 Cemetech & Christopher Mitchell :: Page Execution Time: 0.033336 seconds. jsTIfied Online TI-83+/TI-84+ Emulator Category: Web Applications (back to list) Project Page: jsTIfied Online TI-83+/TI-84+ Emulator project page Summary: If you ever wanted to use an online graphing calculator in your browser, now you can! Take screenshots, test files, even enjoy SourceCoder integration. Complete: Begin: December 4, 2011 Completed: December 31, 2012 jsTIfied is an online graphing calculator emulator, emulating the TI-83 Plus, TI-83 Plus Silver Edition, TI-84 Plus, and TI-84 Plus Silver Edition. It runs entirely in your browser using HTML5 and Javascript, so it requires neither Java nor Flash. Table of Contents 1. Overview » 2. How Does It Work? » 3. Links and Information » 1. Overview jsTIfied is an online graphing calculator emulator, emulating the TI-83 Plus, TI-83 Plus Silver Edition, TI-84 Plus, and TI-84 Plus Silver Edition. It runs entirely in your browser using HTML5 and Javascript, so it requires neither Java nor Flash. For legal reasons, you must load your own ROM image, which is stored in your browser and never sent to the Cemetech server. As a full calculator emulator, it offers lots of features: Full TI-83+/TI-84+ emulation including accurate LCD physics for good-looking grayscale Runs on all major browsers and operating systems Can take animated and still screenshots Load any .8xp, .8xk, etc program or App to test it Drag calculator files onto the jsTIfied LCD to import them Can export all files from the emulated calculator Integrated with the SourceCoder TI-BASIC IDE/editor, so that you can write programs in SourceCoder and immediately test them on a calculator Built-in debugger and CPU/memory view for assembly programmers Click here to launch the jsTIfied online graphing calculator emulator, check out the video below for an overview of the major highlights, or read on for more details about how jsTIfied works. 2. How Does It Work? The jsTIfied emulator is written entirely in Javascript and HTML5. It was long a dream of mine to be able to create such an online emulator, but until recently, this was impossible. A variety of factors came together to finally make jsTIfied feasible, namely: The Javascript File API: This API provides a means for Javascript to directly load files, rather than simply sending them off to a remote server as a form attachment. This API was important because for legal reasons, I did not want users' ROM images to be stored on or even pass through the Cemetech web server. DOM Storage: Just as Flash applications are allowed to store a small amount of data in clients' browsers for the next time they launch, a reasonable graphing calculator emulator would need to store data in the user's browser. The most obvious piece of data is the ROM image, which can be up to 2MB for a TI graphing calculator, but there's also the calculator's RAM, current flash, ASIC, keypad, and LCD state, preferences, debugger settings, and more. The Canvas API: Instead of doing something kludgy like manipulating thousands of tiny divs, programmers can create images from Javascript with Canvases, vital for a Javascript graphing calculator emulator to have a fast, realistic LCD screen. Browsers like Firefox even let users right-click on the canvas and save it as an image. Fast, efficient JIT JS interpreters: Perhaps the most important on this list, modern Javascript interpreters coupled with modern consumer hardware are actually fast enough to emulate a 15MHz processor in Javascript. Other coders' projects have demonstrated GameBoy, ZX Spectrum, and even 386 emulators in Javascript. In order to understand how it works, you must know a little bit about how graphing calculators (or any basic embedded system) works. I'll give you a very high-level overview, assuming you know the basics of computer architecture theory and practice. High-Level Overview jsTIfied is built as a series of modules, roughly corresponding to either a major component of a graphing calculator or a major feature of the emulator. Figure 1 shows the major modules of jsTIfied, categorizing them as emulator features or calculator components. Figure 1: A flowchart of major jsTIfied components. Blue are modules with calculator hardware equivalents, purple are emulator-related features, and turquoise are network-dependent features. Larger text and larger boxes correspond to modules that require more code. Figure 1 shows that while the majority of the code in jsTIfied corresponds to physical hardware features of a TI graphing calculator, a substantial amount is also necessary for emulator-specific features and tools. Let me tell you about each of the modules in Figure 1, how they work, and how they communicate with other pieces of jsTIfied. z80 CPU: The CPU (processor) is the heart of jsTIfied, and occupies a huge amount of code. Although automated tools adapted from the FUSE emulator helped simplify the process, a great deal of tweaking, optimization, and adjustment was necessary. The CPU includes the code to process instructions, all of the z80's registers, and most of the code to manage interrupts. Memory: The memory module handles raw memory reads and writes. While many go to RAM, some also go to ROM, and writes to special addresses trigger special "meta" flash commands. The ASIC in the TI-83+ and TI-84+ includes several numerical ports that remap pages around the device's address space, and intercepts all memory commands, so this module shares some of the work of the ASIC modules. Flash: Handles only the "meta" flash commands, such as those used to erase sectors, pages, or the entire chip, or fetch its capacity or ID. Reads and writes from/to EEPROM are handled by the memory module. TI ASIC: The second-largest module other than the z80 CPU. Serializes and deserializes calculator-wide state including the RAM, ROM, and ports into and out of DOM storage. Mediates between the SourceCoder and file import/export module and the calculator's virtual link port to allow files to be send to and from the emulated calculator. Handles the main event loop that feeds opcodes to the CPU, times and hands interrupts off to the CPU, and handles z80 port input and output. Not shown: timer module that handles TI-84+-specific crystal timers, technically part of the ASIC but broken out into a separate module for jsTIfied. 96x64 LCD: Thanks in part to research from the PindurTI emulator, emulates very accurate LCD physics, which makes grayscale look good and calculations and graphs look authentic. Emulated physics include LCD power levels, pixel turn-on and turn-off intensity profiles, and sub-pixel emulated LCD pixel divisions. Keypad: Practically a single function, sets internal ASIC registers in response to Javascript key up and key down events. Debugger: Reads CPU state and memory state from the z80 CPU and memory modules. Also includes a rudimentary disassembler to render memory as z80 ASM code. Linking Assist: Part of the ASIC; a variety of functions to perform silent linking to send files to the calculator and get them out again. Also used to list the variables present on the emulated calculator. Screenshot Tools: Includes code to once or periodically grab an LCD image, and generate a GIF image. Although a public GIF library was used as the base for this functionality, such extensive changes were made to fix bugs, introduce new GIF features, and optimize the size of the resulting files that it is practically a new GIF library. SourceCoder, File Import/Export: A simple set of functions to interact with SourceCoder's API. AJAX Interface: Standard AJAX functions to push and pull data to and from the Cemetech server. Because Javascript cannot directly output files to the client's browser, jsTIfied uses the Cemetech server as a mediator for screenshots and files. It pushes the data to be exported, then opens an invisible iFrame that causes a file download dialog to appear. To the layperson, the logic behind some of the design decisions that I made may not be obvious. Why, for example, was it so important to keep the ROM images on the users' computers? Or why did I choose to implement/overhaul GIF rendering in Javascript rather than use simple server-side GIF libraries? Critical Design Decisions jsTIfied's design was influenced by several key considerations. First and foremost, it had to be fast, whether one or 1000 users were using it simultaneously. Secondly, it had to be reasonably secure, preventing the possibility that users might lose proprietary state stored on their devices. Thirdly, it had to be legal: many emulators have been become unavailable over the years by including or releasing ROM images. Fourthly, it had to be as compatible as possible and require minimal prerequisites. Finally, it had to offer most if not all (or more!) features compared to offline, installable emulators. Among the decisions that each factor influenced: Fast: Although Javascript is not an inherently fast language, modern JIT Javascript engines help. To eke out every bit of speed possible, I use Google's Closure compiler, compress global names to reduce symbol table lookup times, and performed many rounds of profiling and optimization using Firebug and Chrome's JS profiler. To make sure that users get a consistent experience, I made sure that almost none of jsTIfied's required computing power comes from Cemetech's own servers. The most server-intensive features are exporting screenshots and exporting files, and even those simply require the server to echo a data stream back to the client. It would also be impossible to include the Cemetech server in the loop for any critical part of the emulation due to variations in latency. Secure: All RAM and ROM state is kept on the clients. Screenshots and file exports are bounced through the Cemetech server due to Javascript limitations, but are not cached or stored server-side. Legal: According to most interpretations of the law, ROM images are specific to the device from which they're dumped, on the grounds that in buying the device (ie, the calculator) you purchased a license for its software (ie, its operating system), and by duplicating or distributing a ROM you are illegally distributing software without authorization or a license. By using DOM Storage to keep the jsTIfied ROM from touching the Cemetech server, there is no question that users are using only their own ROM, and that Cemetech isn't inadvertently turning either itself or its users into legally-vulnerable criminals. Compatible: By requiring only a browser and Javascript, jsTIfied can run on any operating system with a decent browser, from Windows, Linux, and Mac OS to mobile devices. Flash and Java would both be too cumbersome of requirements for the job, not to mention that I dislike Java and have little Flash experience. Features: By using a webapp approach, new features will be instantly pushed to every user. Javascript is now powerful and expressive enough that all the essential emulation features, plus extras like a debugger and screenshots, are possible without sacrificing the real-time speed of the emulation. Emulation Example: The DJNZ Instruction To help you understand the very basics of how jsTIfied works, let me show you an example of one opcode being executed. In z80 assembly, the djnz opcode is a "decrement and jump if not zero" instruction. It operates on the b register, one of the several 8-bit registers in the z80 CPU. It first decrements b, then checks if it is zero. If so, it continues to next instruction past the djnz, but if b is not zero, it jumps to the label mentioned after the djnz. An example of some real code that uses djnz: ld a,(randData) ;save randomness of data ld b,255 ;255 bytes to clear ld hl,MainSafeRAM ;clear our saferam areas InitClearLoop: ld (hl),0 ;put zero in it inc hl ;go to next byte djnz InitClearLoop ;done yet? ld (randData),a ;recall contents of random data First, I want to tell you a little more about djnz. Every z80 instruction takes a certain number of clock cycles, and as on most processors, jump instructions take longer when the jump is taken. Luckily, there are plenty of tables for z80 opcodes that tell you everything you need to know:Mnemonic Clock Siz Opcode DJNZ $+2 13/8 1 10 As you can see, the djnz intruction takes either 13 or 8 cycles to execute and starts with byte 0x10. It is followed by one byte that indicates how far to jump forwards or backwards. Here's how the djnz line in that code above gets assembled:Addr Data Code 6C80 10 FB djnz InitClearLoop As you can see, this instruction happens to be at address 0x6C80. The key bytes from the program here are 0x10, the djnz instruction itself, and 0xFB, which means to step backwards 256-251-2 = 3 bytes to address 0x6C80-3=0x6C7D. Let's imagine that we're executing this on jsTIfied. When we start executing this instruction, the CPU will already have plenty of state. The z80 variable in jsTIfied holds the current CPU state, including registers z80.pc (the program counter, the address of the currently-executing instruction), and z80.b (the value of the b register). We'll start with z80.pc = 0x6C80 and z80.b = 2. The very core of the emulated z80 processor is the z80.step() function, which looks like this:function z80.step() { if (z80.breaks) { // trigger on breakpoints for(var i=0; i if (z80.breakp[i] == z80.pc && !debug_stepping) { debug_trapped = true return } } } im = z80.im // used for breaking when the interrupt mode changes var tss_old = tss; tss += 4; z80.r = (z80.r+1) & 0x7f //every instruction is at least 4 t-states var op_code = ti_83p_read(z80.pc++); z80.pc &= 0xffff switch(op_code) { ... case 0x10: // if opcode is a djnz... tss+=4 // We already added 4, now we have 8 z80.b = (z80.b-1) & 0xff // decrement b and overflow as necessary if(z80.b) { tss += 5 z80.pc += extend_sign(ti_83p_read(z80.pc)); //sign-extend the byte after PC to a word, add z80.pc &= 0xffff // wrap around over 0xffff } z80.pc++ // increment past the jump distance byte z80.pc &= 0xffff //fix the overflow if there is any break //and done ... } ... } Focus on the part of the code near the end that processes the case where op_code=0x10, the code for djnz. The tss variable tracks the number of clock states that have elapsed, and for every instruction, the z80.step() function adds at least 4 clock states, since the fastest instruction takes 4 clock states. In the case 0x10: code, we add another 4, since the no-jump djnz case takes 8 clocks. Next, the function decrements b, and since b is an 8-bit variable, fixes an underflow from -1 to 255. If z80.b is not equal to zero, then the code adds another 8 clocks to tss (making 13 total), and modifies z80.pc to take the jump into account. Finally, whether the jump is taken or not, the code increments z80.pc one more time, and fixes z80.pc if it overflows. And that's all there is to it! Of course, there are about 500 other cases for all of the other instructions the z80 CPU supports. There's plenty of other code around this, including the code that refreshes the screen every time a certain number of clock cycles passes, but this is all you need to know to get an idea of what jsTIfied spends most of its time doing: emulating many z80 instructions very fast. Conclusion I hope you enjoyed this short introduction to jsTIfied's inner working and found it edifying. Don't hesitate to snag me (Christopher "Kerm Martian" Mitchell) on the Cemetech forum, the SAX chat widget, or #cemetech on the Efnet IRC network if you have any questions, comments, or suggestions. 3. Information and Links jsTIfied online graphing calculator emulator "Like" jsTIfied and Cemetech on Facebook © Copyright 2000-2025 Cemetech & Christopher Mitchell :: Page Execution Time: 0.029522 seconds. We have many options to use the TI-83 calculators online, you can leave your TI-83 at home. You will enjoy a colorful screen, fast speed and full functionality for your Calculus, Statistics and Algebra classes. Access the free Online Calculator below, runs on Windows computers, Macs and even Smart Phones. There are 3 types of TI-83 Graphing Calculators: The original TI-83 (1996), the TI-83 Plus (1999) and the most recent TI-83 Plus Silver Edition(2001). TI-83 Plus Silver Edition The TI-83 Plus Silver Edition is the best TI-83 calculator: It has the most memory (1.5MB of Flash Memory and 96KB of additional Memory RAM), the fastest processor and the stand out translucent silver case. It has more preloaded Apps than previous TI-83 calculators. The look and feel of the TI-83 and TI-84 calculators are almost identical. In fact, the TI 84 Plus Silver Edition Graphing Calculator replaced the TI 83 Silver Edition in 2004. The TI-83 has not been updated since 2001 whereas the TI-84 keeps being updated. The latest TI-84 Edition is the TI-84 Plus CE Python. Conclusion: Since the TI-83 and TI-84 cost about the same, the latest TI-84 is the better choice. You will enjoy a colorful screen, faster speed, much more battery power. Additionally, many more preloaded apps and more games are availble. Yes, it can be used on ANY Standardized Test because it does not have a Computer Algebra System (CAS) nor WiFi nor bluetooth built in. Specifically, TI-83 Plus CE Python is .... Approved for AP Physics, Approved for AP Chemistry, Approved for SAT II Math IIC, Approved for SAT II Math IC, Approved for ACT, Approved for AP Calculus, Approved for SAT I, Approved for PSAT Read: ACT approved Calculators You may downlad the free TI-83 / TI-83 Plus Manual (PDF) here: TI 83 Calculator Manual Using the TI-83 is pretty easy - if you know which buttons to press. The easiest way to learn how to use the TI 83 Graphing Calculator is to watch this brief instructional video below. You will become an expert right after watching. If you have further questions just send us an email and we will help you where needed. 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