The AP CS Principles Exam Reference Sheet
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Other Resources
Two resources come highly recommended by some of our 2016–17 teachers:

- Fast Track to a 5: Preparing for AP Computer Science Principles Examination ($19.50 from National Geographic Learning)
- Albert.io: Sample exam questions for AP CS Principles, organized by the “Big Ideas” of the framework, are available at: http://tiny.cc/dwulgy.

Multiple Choice
1. Which of the following is NOT a benefit of cloud computing?
   a. Data can be backed up offsite to protect against local emergencies or disasters.
   b. Users can access data from any remote location or setting that has online access.
   c. Multiple users can collaboratively interact with shared data.
   d. Cloud data cannot be subpoenaed by law enforcement.

2. Which of the following is a direct consequence of the “digital divide”?
   a. Internet service providers throttle available bandwidth to customers based upon the type of data being transferred.
   b. Members of poorer or more remote communities are excluded from the benefits of essential online services and resources.
   c. Online services collect and sell personal information about customers based upon usage patterns.
   d. Internet users are able to ensure secure communication channels through the use of strong encryption.

3. Which of the following best describes the client-server model of online computing systems?
   a. Using a client application, like a web browser, a user transmits requests over the internet to a remote server that responds with the requested web page or other digital resource, which is transmitted back to the original user.
   b. Individual users, known as clients, purchase online connectivity from internet service providers, known as servers.
   c. A website uses a variety of client applications to automatically generate dynamic web content that individual users serve to each other.
   d. The internet consists of a network of interconnected nodes, known as client-server devices, that route communications back and forth between one client-server and its nearest neighbor.

4. Which of the following best describes the function of the domain name system (DNS)?
   a. DNS is a service that individuals or corporations can use to purchase and register ownership of domain names.
   b. The domain name system is a non-profit organization that regulates the introduction and assignment of new, top-level domains (TLD).
   c. DNS provides a directory service that associates a domain name with the IP addresses of the server hosting the domain.
d. DNS determines the most efficient route through a network that a document should follow as it is transmitted from one node to the next.

5. Which of the following is a reason for systems to adopt a new internet protocol standard (IPv6) instead of the original standard (IPv4)?
   a. IPv6 allows data to be transferred at much higher speeds than with IPv4.
   b. IPv6 allows a much larger range of addresses than IPv4.
   c. IPv6 enables encrypted communication, whereas IPv4 does not.
   d. IPv6 offers lossless compression of data, whereas IPv4 uses lossy compression algorithms.

6. When Tim Berners-Lee developed the first specifications, protocols, and tools for the World Wide Web in 1993, his employers at CERN chose to make the underlying code publicly available on a royalty-free basis so that anyone who ever wanted to use it or build upon it could do so without having to pay any licensing fees to CERN or ask for CERN’s permission.
   Which of the following best describes the reasons for this decision?
   a. CERN did not recognize the full potential of the World Wide Web and did not think it was worth investing any more of its own resources into its further development.
   b. By offering the Word Wide Web as a freely available alternative, CERN hoped to discourage people from using America Online, CERN’s biggest competitor for online communication services.
   c. Had the technology been proprietary (i.e., closed and privately licensed), it would likely not have become as popular as it has or have been adopted by so many users and institutions across the globe.
   d. Because Tim Berners-Lee did not ask his employers for permission before using CERN resources to develop the World Wide Web, as punishment, he was required to give the technology away for free and sacrifice the millions of dollars he could have personally made by selling his idea for a profit.

7. A pair of young entrepreneurs has decided to use an online crowdfunding website to launch a campaign designed to raise funds for a programmable kitchen appliance that they envision designing, selling and building a business around.
   Which of the following technological advances has NOT contributed toward making this new form of fundraising possible?
   a. GPS (Global Positioning System)
   b. Encryption
   c. World Wide Web
   d. Online banking and e-commerce

8. Which of the following is an example of a service that utilizes an asymmetric, “publisher-subscriber” model for distributing online communications?
   a. Video conferencing
   b. SMS text messaging
   c. Online chat
   d. Blogging

9. Urban planners have proposed the creation and installation of “smart intersections” that can replace existing traffic lights in congested urban areas. Rather than regulating traffic flow with alternating red (“Stop”), yellow (“Caution”), and green (“Go”) lights that human drivers obey, a centralized “intersection controller” device would wirelessly communicate directly with the onboard computers in autonomous vehicles to coordinate how and when it is safe for them to proceed through the intersection. In such a scenario, a car approaching an intersection would wirelessly signal the intersection’s controller unit with its current speed and distance to request permission to enter the intersection. The controller would then
dynamically calculate the ideal “entry” and “exit” times for when the car can safely proceed through the intersection without colliding with any other vehicles that might also be passing through the intersection from other directions at the same moment. As it calculates the trajectories for all approaching vehicles, the controller would relay instructions to each car, which would then adjust its own speed so that it arrives at the intersection at the right time and speed to pass through the intersection untouched. For non-autonomous vehicles, a secondary visual signaling device (something similar to existing traffic lights) would need to be devised that would allow any human drivers to interact safely with the computer-controlled vehicles passing through the intersection.

Researchers have shown through computer simulations and modeling that such “smart intersections” would be capable of simultaneously coordinating the actions of up to two dozen cars all approaching the same intersection from four different directions safely without collisions or delays. Their studies have shown that in cases with as few as half of all cars having the necessary autonomous driving technology to work with such systems, they could relieve traffic congestion at busy intersections by almost 50% and reduce the time that drivers currently sit at red lights by more than 65%.

Despite these promising results, much work needs to be done before these “smart intersections” can be deployed throughout cities. Which of the following is NOT a step that lawmakers would need to resolve in order to make “smart intersections” a reality?

a. New traffic laws would need to be written for existing intersections that specify how autonomous vehicles should handle the standard red-yellow-green traffic signals of standard intersections.

b. New traffic laws would need to be written for “smart intersections” that specify how human drivers (i.e., those operating vehicles that are NOT fully autonomous) should handle the secondary visual signals of computer-controlled “smart intersections.”

c. Liability would need to be determined in the event of accidents caused by faulty intersection controllers and/or autonomous vehicles.

d. Regulations must be passed that specify the minimum hardware and software requirements of fully autonomous vehicles so that they are compatible with the “smart intersections.”

10. Which of the following best describes the controversies surrounding the ethics of pre-programmed decision-making with regards to self-driving cars and other autonomous technologies?

I. Autonomous technology reduces chance of human error.

II. Autonomous technology allows for programmed responses for certain situations, not all of which are beneficial for the user or owner.

III. It is unclear who is at fault for failures by autonomous technological machines (e.g., programmers, owners).

a! I only

b! I and II

c! II and III

d! I, II and III

11. Which of the following is the most important factor when using e-commerce services?

a. Purchasing only the items you need

b. Verifying that the website provides secure transactions

c. Ensuring reliable internet access

d. Using only e-commerce services that you have used before

12. According to the domain name system (DNS), which of the following is a subdomain of the domain example.com?
a. about.example.com  
b. example.co.uk  
c. www.example.com  
d. example.org

13. What type of communication takes place between two individuals or parties and the use of encryption so that only the desired individuals have access to what is being said or heard?
   a. Public  
b. Private  
c. Symmetric  
d. Asymmetric

14. An open platform enables third parties to add functionality to already existing technologies by using existing standards. Which of the following does not describe the idea of an open platform?
   a. Hardware used for USB ports are common so that they accept different brands of flash drives regardless of the computer being used.  
b. Twitter allows other programs like Hootsuite and TweetDeck to send data back and forth between the program and Twitter’s databases.  
c. Google helps to develop a version of Android, but the OEMs have to work in order to fine tune it to fit their own devices and their own needs.  
d. Apple’s iOS allows you to download several applications from only the Apple App Store unless you “jailbreak” your device.

15. Online search engines like Google, Bing and DuckDuckGo help to make information readily available to us when we need it. However, what do Wikis do that these search engines do not that also makes them useful in their own sense?
   a. They prioritize results based on the relative connectedness of web pages.  
b. They catalog results so you know exactly where to find the source of the information.  
c. They help consolidate and organize information into a nice online reference.  
d. They can index results so that you can sort through them to get to a desired result.

16. What is not a benefit of cloud computing?
   a. The freedom of cloud computing allows you to access data from any device that has a connection to the internet – anytime and anywhere.  
b. Security and data breaches are uncommon when using cloud computing, so there is no reason to worry about the wrong person accessing your data.  
c. Storage capacity of the cloud you are using can be expanded to as large as you need simply by buying more storage.  
d. More collaboration can occur because files can be easily shared and accessed by multiple people all around the world.

17. Some countries lack physical resources, like computers or network connections, making it difficult to keep up with the technology of the world. These same countries or locations lack the digital skills and literacy, being comfortable with technology and understanding how to effectively use it, needed in order to be successful in this connected world. The situation described above is commonly referred to as what?
   a. The device debacle  
b. The technology rut  
c. The digital divide  
d. The great internet shortage
18. IP addresses express a node’s relative location in a network and are normally represented by a 32-bit number. The numbers are presented in 4 sets of values from 0 – 255 to make them more readable (i.e. Google is represented by 74.125.224.72). Currently, most of the world is using IPv4 addresses as the standard, but in some areas, addressing is now being done according to IPv6 standards. How many bits are used for these new IP addresses?
   a. 64
   b. 96
   c. 128
   d. 256

19. What is the primary transport protocol used by the World Wide Web for delivering web content?
   a. HTTP
   b. TCP
   c. IP
   d. ISP

20. What best describes how a web browser and a web server interact with each other?
   a. A web server is a vast network of interconnected computers that store information. When a client uses a web browser, the information found on the internet can be found and displayed.
   b. A web browser is a client application that is run on a user’s computer that requests information from the web server that hosts all the files you are requesting.
   c. A web server is a program that a user can use to access information from a web browser, which in turn will display the content.
   d. A web browser is used by a client to request information on the internet. The web server is another client that is requesting the same information. Together, both the web server and web browser simultaneously view the content.

Multiple Response
21. Which of the following are features of the HTTPS protocol?
   Select two answers.
   a. The HTTPS protocol enables data to be edited simultaneously on multiple remote Computers (i.e. like what can be done with Google Docs).
   b. The HTTPS protocol ensures that documents are transmitted securely using a standard encryption layer, like SSL or TLS.
   c. The HTTPS protocol defines the standards for transmitting hypertext documents, such as those that have been formatted according to the HTML standard.
   d. The HTTPS protocol ensures that files sizes are reduced using lossless compression algorithms (i.e. Huffman Coding).