Beijing National Day School
Department of Mathematics

AP Computer Science Principles

Test 3: Global Impact

Exam Record

Part1_____/ 30 pts

Part2_____/ 16 pts

Total:_____/ 46 pts

Grade:_____

English Name:_____

Pinyin Name:_____

Mr. Alwin Tareen, Spring 2019

AP Computer Science Principles Test 3: Global Impact Mr. Alwin Tareen
Spring 2019 BNDS

Part I: Multiple Choice (30 points)

- Determine the answer to each of the following questions, using the available space for any necessary scratchwork.

- Decide which is the best of the choices given, and select the correct answer by placing an "**X**" in the corresponding box.

(1^{pt}) **1.** What is an issue that organizations must handle when dealing with large datasets?

☐ Ensuring enough staff are on hand to process the data.

☐ Ensuring the bandwidth can handle the processing of the data.

☐ Ensuring that people's private data is not exposed.

☐ Ensuring the system can scale down after the data is sent to the cloud.

$\boxed{\text{1 pt}}$

(1^{pt}) **2.** What is the most effective way in which large datasets should be analyzed?

☐ Using information filtering and search tools, because they are efficient.

☐ Using frequency analysis tools, so patterns stand out.

☐ Using exponential tools for faster analysis.

☐ Using linear tools to see patterns as they develop.

$\boxed{\text{1 pt}}$

(1^{pt}) **3.** How has the sharing of information globally with experts impacted the medical field?

☐ Diagnosis and consultations can be done by non-local experts.

☐ There's been an increase in the sales of hardware needed to create the Internet to enable the sharing of data.

☐ Privacy laws have prevented the sharing of patient data on the Internet. It can be discussed online after sending the data using a delivery service.

☐ Social media sharing has increased the general public's knowledge of disease outbreaks.

$\boxed{\text{1 pt}}$

(1^{pt}) **4.** How is collaboration useful in analyzing datasets?

☐ The multiple viewpoints can provide several outcomes for the data.

☐ Applying differing experiences and skills provides better analysis and insight.

☐ The analysis can be divided among several people, speeding up analysis.

☐ Having multiple leaders helps the group form alliances based on interests.

$\boxed{\text{1 pt}}$

(1^{pt}) **5.** Why is "Big Data" important to science and business?

☐ The investment in the time and expense of processing big data is large, so the expectation for critical findings is huge.

☐ It can identify trends, or solve problems that smaller datasets may not identify.

☐ It is too large to process when time is short, so businesses cannot use it effectively to react quickly enough for product changes.

☐ It is useful to generate new research possibilities, so it is only important to science.

$\boxed{\text{1 pt}}$

$\boxed{\text{5 pts}}$

(1ᵖᵗ) **6.** How can social media have a positive global impact?

☐ By allowing people to post their views anonymously and safely.

☐ By allowing accounts of unverified events to spread quickly.

☐ By providing a way for those impacted by disasters to communicate that they are safe.

☐ By posting images or videos without a person's permission, to make them famous.

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1 pt

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(1ᵖᵗ) **7.** What should people do, in order to ensure that online sources are credible?

☐ Review the author, publisher, and sponsor credentials.

☐ Check to see if the site has anything that has gone viral, to ensure credibility.

☐ Read the comments at the bottom of the article, to see if they validate the article's claim.

☐ See how active the author is on social media, for reliability.

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(1ᵖᵗ) **8.** Which of the following choices would be a good project for citizen scientists, and why?

☐ Counting pine trees in urban conditions, to get accurate data about the spread of the pine beetle.

☐ Identifying new stars using personal telescopes, to keep costs lower for the tracking organization.

☐ Reading different genre books and evaluating them, so book publishers know which types of book manuscripts to accept and market.

☐ Counting fish in a lake, to know if the fish are safe to consume.

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(1ᵖᵗ) **9.** Which of the following choices is an example where the analysis of large data sets would NOT be able to identify potentially valuable information?

☐ Identifying risk factors for certain health issues.

☐ Identifying which aspects banks should focus on, to minimize loan defaults.

☐ Enabling companies to know when to schedule replacement of equipment parts, because of usage and increased maintenance on them.

☐ Enabling businesses to know what to produce, and when, for maximum sales.

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1 pt

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(1ᵖᵗ) **10.** Why do businesses and scientists attempt to analyze big data?

☐ To gain insights that smaller subsets of data may not provide.

☐ To confirm findings from smaller data sets.

☐ To identify potential problems in the metadata.

☐ To obtain economies of scale, with hardware needed to store the data based on Moore's law.

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1 pt

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(1ᵖᵗ) **11.** Which option below is a potential negative result of storing data in the cloud?

☐ You have to rely on someone else to maintain the security of the data.

☐ Online collaboration could result in accidentally overwriting someone's changes to a document.

☐ You must store duplicates of data stored in the cloud, in case you cannot access your data when needed.

☐ The company storing your data could hold it for ransom, until you paid extra fees.

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1 pt

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6 pts

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(1$^{\text{pt}}$) **12.** Data mining allows organizations to process huge data sets to find new patterns, connections or opportunities. Which of the following is NOT a downside of data mining?

☐ It may require having to train staff and allocate resources based on data results.

☐ More relevant information is included on the company's website.

☐ It is expensive to collect, store, and process data.

☐ It is risky for decision making, if the data is interpreted incorrectly.

1 pt

(1$^{\text{pt}}$) **13.** Computers have enabled new innovations in a variety of industries. In the entertainment business, it has become much easier to purchase and share new music. What concern has been raised as a result?

☐ People are modifying other people's content, and claiming that the Creative Commons licensing allows it.

☐ People are being discovered for their music, because others are posting it to music-sharing sites.

☐ People are sharing content without the author/owner's permission.

☐ Artists are adding their music to streaming services, with Creative Commons licensing.

1 pt

(1$^{\text{pt}}$) **14.** Which of the following are legal and ethical concerns because of the DMCA?

☐ Peer-to-peer networks used for illegal file sharing.

☐ Music and movie downloads, and streaming services are not charging enough for their services.

☐ Licensing stipulations that allow incorporating music into other platforms.

☐ Controlled intellectual property sharing.

1 pt

(1$^{\text{pt}}$) **15.** What is a benefit of the government posting databases for public use?

☐ It is a way to identify the need for new policies and regulations.

☐ Consumers can learn more about how their individual data is being collected, stored, and used.

☐ Companies can opt out, to prevent competitors from learning about their business.

☐ All businesses can access the data at no cost, aiding those businesses that would otherwise not have the resources to obtain the data on their own.

1 pt

(1$^{\text{pt}}$) **16.** An new discovery has been made from analyzing data. Which of the following methods will most effectively share the discovery?

☐ Create a video explaining the highlights, and wait for it to go viral.

☐ Use diagrams and images, and publish the discovery on a professional website, for peer review.

☐ Post it on the Web, but with a password, to ensure that only those in the field of study can view it.

☐ Publish the findings in a local newspaper.

1 pt

5 pts

(1ᵖᵗ) **17.** New data is available to add to a company's existing data. The IT director wants to store the new data on the cloud. What is a concern that needs to be addressed, before implementing the plan?

☐ The security of the data being transmitted back and forth.

☐ The latency delay in requesting and receiving access to the data.

☐ The redundancy of the Internet, increasing the cost.

☐ The cost that the ISP will charge, to access the cloud.

1 pt

(1ᵖᵗ) **18.** Which of the following choices would best help organizations gain insights about their business?

☐ Collecting and analyzing big data, to identify patterns and trends that they could use to their advantage.

☐ Separating big data into smaller data sets, and analyzing those, for faster results.

☐ Developing decryption data techniques to be able to drill down and analyze data that the government posts online.

☐ Creating copies of company data, to let each division do their own analysis, without impacting others.

1 pt

(1ᵖᵗ) **19.** While crowdsourcing is often used to fund projects, what is another use in practice today?

☐ Diagnosing medical conditions, by asking if others have similar symptoms.

☐ Asking those who register with a company to evaluate new products.

☐ Lowering costs by using the crowd's computers.

☐ Matching people needing work with job openings.

1 pt

(1ᵖᵗ) **20.** If data mining identifies new patterns, what should a company do with the information?

☐ Further analyze the data pattern identified, to make strategic decisions.

☐ Change the prices on their products, to match the findings for increased sales.

☐ Get their products to market faster, to increase their profit.

☐ Use it to place targeted ads with people who are repeat customers.

1 pt

(1ᵖᵗ) **21.** What is the purpose of the DMCA?

☐ To provide legal protection for any intellectual property in digital format, which has copyright status.

☐ To enable music and movie downloads and streaming, for wider sharing of people's creative works.

☐ To give acknowledgement to the creator of a digital work, when it is used by others.

☐ To provide the software to share digital files legally.

1 pt

5 pts

(1^{pt}) **22.** Computers are often used to search through large sets of data, to discover useful patterns. Which of the following tasks is NOT an example where searching for patterns is needed to produce useful information?

☐ A credit card company analyzing credit card purchases, to identify potential fraudulent charges.

☐ A grocery store analyzing customers' past purchases, to suggest new products that the customer may be interested in.

☐ A high school administrator analyzing student grades, to identify those students with the top ten highest grade point averages.

☐ An online retailer analyzing customers' viewing habits, to suggest other products that are based on the purchasing history of other customers.

1 pt

(1^{pt}) **23.** A large data set contains information about all students majoring in computer science in various colleges across the United States. The data set contains the following information about each student:

- The student's gender
- The state in which the student attends college
- The student's grade point average on a 4.0 scale

Which of the following questions could be answered by analyzing only the information in this data set?

☐ Do students majoring in computer science tend to have higher grade point averages than students majoring in other subjects?

☐ How many states have a higher percentage of female computer science majors than male computer science majors attending college in that state?

☐ What percent of students attending college in a certain state are majoring in computer science?

☐ Which college has the highest number of students majoring in computer science?

1 pt

(1^{pt}) **24.** A retailer that sells footwear maintains a single database containing records with the following information about each item for sale in the store.

- Item identification number
- Footwear type(sneakers, boots, sandals, etc.)
- Selling price(in dollars)
- Size
- Color
- Quantity available

Using only the database, which of the following can be determined?

☐ Which items listed in the database are not currently in the store.

☐ Which colors are more popular among men than women.

☐ Which type of footwear is most popular among adults.

☐ The total number of shoes sold in a particular month.

1 pt

3 pts

(1pt) **25.** A city government is exploring various methods by which it can more effectively deliver computing and Internet technologies to people from low socioeconomic backgrounds. Which of the following activities is LEAST likely to be effective?

☐ Holding basic computer classes at community centers.

☐ Providing free wireless Internet connections at locations in low-income neighborhoods.

☐ Posting all government forms on the city's website.

☐ Requiring every city school's computers to meet minimum hardware standards.

1 pt

(1pt) **26.** Both online newspapers and social media sites are used to distribute information on the Internet. Which of the following choices best describes an **advantage** that online newspapers have over social media sites?

☐ The ability to distribute information instantaneously.

☐ The ability to provide credibility to the information that is distributed.

☐ The ability to provide information that is widely accessible.

☐ The ability to provide media-rich content, for a low cost.

1 pt

(1pt) **27.** Which of the following choices would best describe the concept of **citizen science**?

☐ An experiment that requires all participants to be working in the same laboratory.

☐ An experiment that requires expensive equipment to conduct.

☐ An experiment that requires data measurements to be taken in many different locations.

☐ An experiment that requires specialized knowledge and training to conduct.

1 pt

(1pt) **28.** A musician is creating a song using audio samples. Which of the following actions will minimize the risk of a copyright violation, when creating sample-based music?

☐ Using samples found on popular music-streaming sites.

☐ Using samples found on peer-to-peer networks.

☐ Using samples from non-digital sound sources(vinyl records, cassette tapes, etc.)

☐ Using samples published with a no-rights-reserved Creative Commons license.

1 pt

(1pt) **29.** Which of the following have been made significantly easier by widespread access to information online?

☐ Making educated decisions about medical problems, such as whether or not to visit a doctor with certain symptoms.

☐ Finding the results of a small research study in a different country.

☐ Locating a job opening with certain specifications anywhere in the world.

☐ All of the above.

1 pt

(1pt) **30.** An app is created that reminds users to take their medication at specific times throughout the day. This program is an example of:

☐ smart grids

☐ assistive technology

☐ widespread access to the Internet

☐ authentication

1 pt

6 pts

Part II: Short Answer (16 points)

- Solve each of the following questions. Write your solution in the space provided.

(2$^{\text{pts}}$)   **1.** Convert the following binary(base-2) numbers to decimal(base-10).

(a) (1 pt) 1011   (b) (1 pt) 10001

2 pts

(2$^{\text{pts}}$)   **2.** Convert the following hexadecimal(base-16) numbers to decimal(base-10).

(a) (1 pt) A7   (b) (1 pt) 2E

2 pts

(2$^{\text{pts}}$)   **3.** Convert the following binary(base-2) numbers to hexadecimal(base-16).

(a) (1 pt) 10010011   (b) (1 pt) 110010100001

2 pts

(2$^{\text{pts}}$)   **4.** Convert the following hexadecimal(base-16) numbers to binary(base-2).

(a) (1 pt) B4   (b) (1 pt) 9C

2 pts

8 pts

(4$^{\text{pts}}$)   **5. Run-length Encoding**

4 pts

- Run-length encoding is a type of compression, where you indicate repeated instances of a character.

- Give the run-length encoding representations of the following text strings.

(a) (1 pt) AAAACCCCCCC

(b) (1 pt) BBFFFGGGGGGMMMMDD

(c) (1 pt) QQQQQQQQRRRRTTTTTTTTTYYYY

(d) (1 pt) ZZZZYYYYWWWWCCCCRRRRRRRRPPPPPPPP

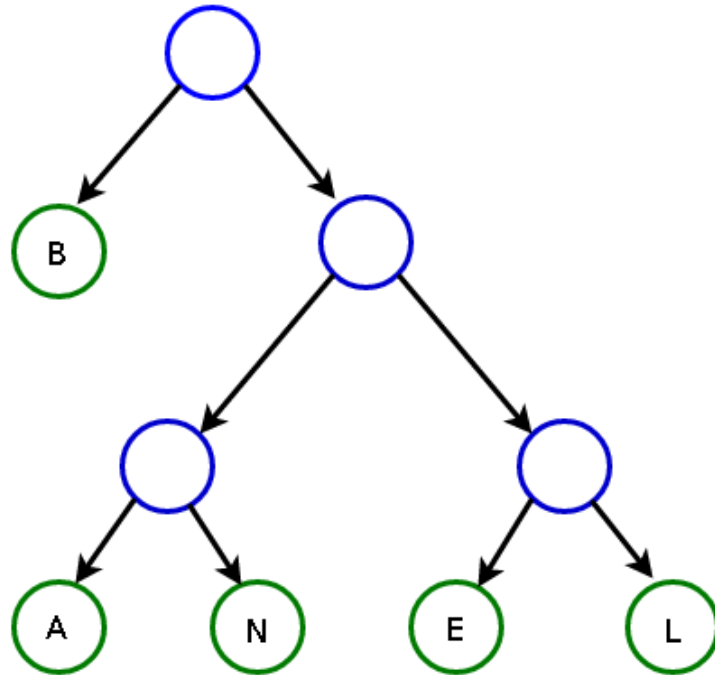4 pts

(4$^{\text{pts}}$)   **6. Huffman's Algorithm**

- Huffman's algorithm is a kind of frequency compression, in which each distinct symbol in a piece of data is given a particular code.

- Each code is a binary bit pattern. Symbols that occur often are assigned shorter codes, and symbols that occur less frequently are assigned longer codes.

(a) (2 pts) Consider the following Huffman Encoding Tree. Label each of the letters of this tree with their corresponding binary bit pattern code. Use the convention that left-hand branches of the tree are assigned a `0`, and right-hand branches of the tree are assigned a `1`.

(b) (2 pts) You should now have a binary code designated for each of the letters of the encoding tree. Use it to decode the following binary pattern, to reveal a secret message:

010010110010101100010000111110

4 pts

4 pts