

Beijing National Day School  
Department of Mathematics & Computer Science

# AP Computer Science Principles

## **Semester 2 Exam**

**Location:** Library, 6th Floor, Aspiration Building

**Date:** Wednesday, June 26th, 2019

**Start Time:** 2:00PM

**End Time:** 4:00PM

**NO CALCULATORS PERMITTED**

English Name: Answer Key

Pinyin Name:

Mr. Alwin Tareen, June 2019

### **Exam Record**

Multiple Choice \_\_\_\_\_ / 30 pts

Short Answer \_\_\_\_\_ / 30 pts

Reflections \_\_\_\_\_ / 30 pts

Total: \_\_\_\_\_ / 90 pts

Grade: \_\_\_\_\_

**Section I: Multiple Choice (30 points)**

- Number of questions: 30. Percent of total grade:  $33\frac{1}{3}$ .
- Decide which is the best of the choices given, and select the correct answer by placing an “X” in the corresponding box.

(1<sup>pt</sup>) 1. Which of the following choices is a legal and legitimate Python variable name?

- 2bad4you  
 calvin&hobbes  
 year2000  
 #hammertime

*Solution:*(1<sup>pt</sup>) 2. You would like to set up a variable called `ounces` that has the value 16. What simple Python statement will accomplish this?

- `ounces = 16`  
 `16 = ounces`  
 `def ounces(16):`  
 `ounces(16)`

*Solution:*(1<sup>pt</sup>) 3. What does the following Python statement print out:

```
print("123" + "abc")
```

- "123" + "abc"  
 This is a syntax error because you cannot add strings.  
 123+abc  
 123abc

*Solution:*(1<sup>pt</sup>) 4. In Python, the `float` data type is used to store:

- booleans  
 decimal numbers  
 strings  
 integers

*Solution:*(1<sup>pt</sup>) 5. What is the result of the following Python statement:

```
print(42%10)
```

- 1042  
 420  
 4  
 2

*Solution:*

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| 5 pts |

- (1<sup>pt</sup>) 6. Which of the following choices is the correct assignment statement for a **string** data type?

- greetings = [Hello]
- greetings = @Hello@
- greetings = "Hello"
- greetings = #Hello#

*Solution:*

- (1<sup>pt</sup>) 7. What is the result of the following Python statement?

```
print(17/4)
```

- 4
- 4.0
- 4.3
- 4.25

*Solution:*

- (1<sup>pt</sup>) 8. What are the only values that are permissible in Python's **boolean** data type?

- Yes, No
- On, Off
- Right, Wrong
- True, False

*Solution:*

- (1<sup>pt</sup>) 9. Which of the following is a comment in Python?

- /\* This is a test \*/
- // This is a test
- # This is a test
- % This is a test

*Solution:*

- (1<sup>pt</sup>) 10. Which of the following elements of a mathematical expression in Python is evaluated first?

- Multiplication \*
- Addition +
- Parenthesis ()
- Subtraction -

*Solution:*

- (1<sup>pt</sup>) 11. What will be the value of x when the following statement is executed: x = int(98.6)

- 99
- 6
- 98
- 100

*Solution:*

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| 6 pts |

(1<sup>pt</sup>) **12.** What does the Python function `input()` do?

- Pause the program and read data from the user.
- Take a screen shot from an area of the screen.
- Read the memory of the running program.
- Connect to the network and retrieve a web page.

*Solution:*

(1<sup>pt</sup>) **13.** Which Python keyword indicates the start of a function definition?

- `sweet`
- `def`
- `continue`
- `return`

*Solution:*

(1<sup>pt</sup>) **14.** Consider the following function definition:

```
def circlearea(radius):
```

In this context, what is the formal name for the variable `radius`?

- expression
- logical deduction
- parameter
- condition

*Solution:*

(1<sup>pt</sup>) **15.** What does the following Python program print out?

```
str1 = "Hello"  
str2 = "there"  
greet = str1 + str2  
print(greet)
```

- Hello there
- Hellothere
- there
- Hello

*Solution:*

(1<sup>pt</sup>) **16.** How would you use the index operator to print out the letter "q" from the following string?

```
x = "From marquard@uct.ac.za"
```

- `print(x[9])`
- `print(x[8])`
- `print(x[-1])`
- `print(x[q])`

*Solution:*

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5 pts

- (1<sup>pt</sup>) 17. How would you use string slicing to print out "uct" from the following string?

```
x = "From marquard@uct.ac.za"
```

1 pt

- print(x[14+17])
- print(x[15:18])
- print(x[14:17])
- print(x[14:3])

*Solution:*

- (1<sup>pt</sup>) 18. What is the iteration variable in the following Python code?

```
for letter in "banana":  
    print(letter)
```

1 pt

- letter
- print
- in
- "banana"

*Solution:*

- (1<sup>pt</sup>) 19. How would you print out the following string in all upper case in Python?

```
greet = "Hello there"
```

1 pt

- puts greet.ucase;
- print(uc(\$greet))
- print(greet.upper())
- console.log(greet.toUpperCase());

*Solution:*

- (1<sup>pt</sup>) 20. What does the following Python program print out?

```
data = "From stephen.marquard@uct.ac.za"  
pos = data.find(".")  
print(data[pos:pos+3])
```

1 pt

- uct
- mar
- .ma
- ste

*Solution:*

- (1<sup>pt</sup>) 21. For the following list, how would you print out "Sally"?

```
friends = ["Joseph", "Glenn", "Sally"]
```

1 pt

- print(friends[3])
- print(friends["Sally"])
- print(friends[2])
- print(friends[2:1])

*Solution:*

5 pts

- (1<sup>pt</sup>) **22.** Which of the following Python statements would print out the length of a list stored in the variable `fruit`? 1 pt

- `print(length(fruit))`
- `print(fruit.length())`
- `print(len(fruit))`
- `print(strlen(fruit))`

*Solution:*

- (1<sup>pt</sup>) **23.** What type of data is produced when you call the `range()` function? For example, consider the statement: `nums = range(5)` 1 pt

- A list of characters
- A list of integers
- A list of words
- A string

*Solution:*

- (1<sup>pt</sup>) **24.** What does the following Python code print out? 1 pt

```
first = [1, 2, 3]
second = [4, 5, 6]
nums = first + second
print(len(nums))
```

- [1, 2, 3]
- [1, 2, 3, 4, 5, 6]
- [4, 5, 6]
- 6

*Solution:*

- (1<sup>pt</sup>) **25.** Which of the following slicing operations will produce the list [12, 3]? 1 pt

```
nums = [9, 41, 12, 3, 74, 15]
```

- `nums[1:3]`
- `nums[2:4]`
- `nums[2:2]`
- `nums[12:3]`

*Solution:*

- (1<sup>pt</sup>) **26.** Which list method adds a new item to the end of an existing list? 1 pt

- `add()`
- `append()`
- `index()`
- `push()`

*Solution:*

5 pts

(1<sup>pt</sup>) **27.** What will the following Python code print out?

```
friends = ["Joseph", "Glenn", "Sally"]
friends.sort()
print(friends[0])
```

1 pt

- Glenn
- Joseph
- friends
- Sally

*Solution:*

(1<sup>pt</sup>) **28.** Which of the following Python functions deletes an element from a list?

- push()
- pop()
- invalidate()
- split()

1 pt

*Solution:*

(1<sup>pt</sup>) **29.** Which of the following Python functions breaks a string into a list of words?

- split()
- join()
- remove()
- extend()

1 pt

*Solution:*

(1<sup>pt</sup>) **30.** What task does the following Python code perform?

```
for num in range(1, 10, 2):
    print(num)
```

1 pt

- It prints all the ODD numbers in the range [1, 9]
- It prints all numbers in the range [1, 9]
- This code fails with a traceback.
- It prints all the EVEN numbers in the range [1, 10]

*Solution:*

4 pts

**Section II: Short Answer (30 points)**

- Number of questions: 30. Percent of total grade:  $33\frac{1}{3}$ .
- Answer each of the following questions in the space provided.

(1<sup>pt</sup>)

1. What is the output of the following Python code:

```
print(3 > 4 or (2 < 3 and 9 > 10))
```

Answer:

1 pt

*Solution: False*

(1<sup>pt</sup>)

2. What is the output of the following Python code:

```
spice = "cinnamon"
```

```
print(len(spice))
```

Answer:

1 pt

*Solution: 8*

(1<sup>pt</sup>)

3. What is the output of the following Python code:

```
breakfast = "pineapple"
```

```
print(breakfast[0:4])
```

Answer:

1 pt

*Solution: pine*

(1<sup>pt</sup>)

4. What is the output of the following Python code:

```
flavor = "strawberry"
```

```
print(flavor[2:5])
```

Answer:

1 pt

*Solution: raw*

(1<sup>pt</sup>)

5. What is the output of the following Python code:

```
lunch = "cheeseburgers"
```

```
print(lunch[6:12])
```

Answer:

1 pt

*Solution: burger*

(1<sup>pt</sup>)

6. What is the output of the following Python code:

```
candy = "bubble" + "gum"
```

```
print(candy)
```

Answer:

1 pt

*Solution: bubblegum*

(1<sup>pt</sup>)

7. What is the output of the following Python code:

```
triple = "hello" * 3
```

```
print(triple)
```

Answer:

1 pt

*Solution: hellohellocello*

(1<sup>pt</sup>)

8. What is the output of the following Python code:

```
greeting = "Hello, world!"
```

```
newgreeting = "J" + greeting[1:]
```

```
print(newgreeting)
```

Answer:

1 pt

*Solution: Jello, world!*

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| 8 pts |

- (1<sup>pt</sup>) 9. What is the output of the following Python code:

```
print("cola" in "chocolate")
```

Answer:

1 pt

*Solution: True*

- (1<sup>pt</sup>) 10. What is the output of the following Python code:

```
print("seed" in "banana")
```

Answer:

1 pt

*Solution: False*

- (1<sup>pt</sup>) 11. What is the output of the following Python code:

```
fruit = "strawberry"  
bigfruit = fruit.upper()  
print(bigfruit)
```

Answer:

1 pt

*Solution: STRAWBERRY*

- (1<sup>pt</sup>) 12. What is the output of the following Python code:

```
vegetable = "cauliflower"  
index = vegetable.find("u")  
print(index)
```

Answer:

1 pt

*Solution: 2*

- (1<sup>pt</sup>) 13. What is the output of the following Python code:

```
line = "Please have a nice day"  
print(line.startswith("Please"))
```

Answer:

1 pt

*Solution: True*

- (1<sup>pt</sup>) 14. What is the output of the following Python code:

```
meal = "fresh pizza is the best pizza"  
print(meal.replace("pizza", "salad"))
```

Answer:

1 pt

*Solution: fresh salad is the best salad*

- (1<sup>pt</sup>) 15. What is the output of the following code:

```
cheeses = ["Cheddar", "Edam", "Gouda"]  
print(cheeses[0])
```

Answer:

1 pt

*Solution: Cheddar*

- (1<sup>pt</sup>) 16. What is the output of the following code:

```
lunch = ["soup", "salad", "rice", "beans"]  
lunch[1:3] = ["fries", "noodles"]  
print(lunch)
```

Answer:

1 pt

*Solution: ["soup", "fries", "noodles", "beans"]*

8 pts

- (1<sup>pt</sup>) 17. What is the output of the following code:

```
food = ["chicken", "beef", "fish"]
supplies = ["soap", "detergent"]
groceries = food + supplies
print(groceries)
```

Answer:

*Solution: ["chicken", "beef", "fish", "soap", "detergent"]*

- (1<sup>pt</sup>) 18. What is the output of the following code:

```
print([0] * 4)
```

Answer:

*Solution: [0, 0, 0, 0]*

- (1<sup>pt</sup>) 19. What is the output of the following code:

```
snacks = ["pizza", "burger"]
snacks.append("fries")
print(snacks)
```

Answer:

*Solution: ["pizza", "burger", "fries"]*

- (1<sup>pt</sup>) 20. What is the output of the following code:

```
notes = ["do", "ray", "mi"]
melody = ["fa", "so", "la"]
notes.extend(melody)
print(notes)
```

Answer:

*Solution: ["do", "ray", "mi", "fa", "so", "la"]*

- (1<sup>pt</sup>) 21. What is the output of the following code:

```
breakfast = ["eggs", "juice", "toast"]
breakfast.insert(1, "bacon")
print(breakfast)
```

Answer:

*Solution: ["eggs", "bacon", "juice", "toast"]*

- (1<sup>pt</sup>) 22. What is the output of the following code:

```
drinks = ["tea", "soda", "cola", "juice"]
drinks.sort()
print(drinks)
```

Answer:

*Solution: ["cola", "juice", "soda", "tea"]*

- (1<sup>pt</sup>) 23. What is the output of the following code:

```
meals = ["breakfast", "lunch", "dinner"]
meals.reverse()
print(meals)
```

Answer:

*Solution: ["dinner", "lunch", "breakfast"]*

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| 7 pts |

- (1<sup>pt</sup>) **24.** What is the output of the following code:

```
snacks = ["pizza", "wings", "soda", "chips"]
snacks.remove("soda")
print(snacks)
```

Answer:

*Solution: ["pizza", "wings", "chips"]*

- (1<sup>pt</sup>) **25.** What is the output of the following code:

```
drinks = ["tea", "coffee", "cookie", "juice"]
pastry = drinks.pop(2)
print(pastry)
```

Answer:

*Solution: cookie*

- (1<sup>pt</sup>) **26.** What is the output of the following code:

```
dinner = ["salad", "bread", "steak", "potato"]
del dinner[1]
print(dinner)
```

Answer:

*Solution: ["salad", "steak", "potato"]*

- (1<sup>pt</sup>) **27.** What is the output of the following code:

```
cheatcode = ["up", "up", "down", "down", "down", "left", "right"]
presses = cheatcode.count("down")
print(presses)
```

Answer:

*Solution: 3*

- (1<sup>pt</sup>) **28.** What is the output of the following code:

```
toppings = ["salt", "cheese", "vinegar", "bbq"]
position = toppings.index("bbq")
print(position)
```

Answer:

*Solution: 3*

- (1<sup>pt</sup>) **29.** What is the output of the following code:

```
lunch = "pizza"
letters = list(lunch)
print(letters)
```

Answer:

*Solution: ["p", "i", "z", "z", "a"]*

- (1<sup>pt</sup>) **30.** What is the output of the following code:

```
favourite = "I like hamburgers"
words = favourite.split()
print(words)
```

Answer:

*Solution: ["I", "like", "hamburgers"]*

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| 7 pts |

**Section III: Reflection Questions (30 points)**

- Number of questions: 3. Percent of total grade:  $33\frac{1}{3}$ .
- Answer each of the following questions in the space provided. These questions are based on material from the book, “Blown to Bits.”

**Reflections from Chapter 1: Digital Explosion**

- (10<sup>pts</sup>) 1. Consider the tragic case of Tanya Rider, who was involved in a serious car accident while driving alone on her way to work. Her car skidded off the side of the road, proceeded down a steep embankment, and came to rest at the bottom of a deep ravine. She was discovered several days later, as rescuers followed the electronic trail that she had left behind. List the several ways in which digital communication was involved in the discovery and ultimate rescue of Tanya. Describe how these aspects were either helpful or not, in solving the case.

*Solution:* The following is a sample answer based on the opinions of the instructor.

Modern digital communications infrastructure played a key role in the discovery and rescue of Tanya Rider. Without such advanced technology, she would have almost certainly perished at the bottom of that deep ravine, trapped in the wreckage of her car. Let’s examine the ways in which digital communications either assisted or hindered her recovery.

First, let’s examine the road network upon which Tanya was driving. Highway engineers are required by law to integrate various safety features into the road networks that they design. Since the scene of Tanya’s accident involved a steep embankment, there must have been some kind of guard railing on the side of the road, which she crashed through. If this railing was embedded with a network of electronic sensors, Tanya’s accident would have been automatically detected, and rescuers could have been dispatched immediately.

Then, let’s examine the car that Tanya was driving. Since the accident occurred in 2007, we can assume that her car was probably built a few years before that time. It would have been equipped with basic safety features, such as seat belts and air bags, but nothing more advanced than that. Since modern communications technology is becoming cheaper and more ubiquitous, car manufacturers need to start integrating more sophisticated safety features into their products. For example, the car could have automatically detected the accident, and sent out a distress call to the local authorities. Then, it could have activated an electronic GPS beacon that rescuers could have followed to the site of the crash.

Tanya received injuries to her leg and shoulder, and those kinds of injuries would have left her practically immobile. If she placed her cell phone in her purse, then it was probably lost in the car wreckage, and she would have been unable to access it. If her cell phone was equipped with voice activation technology, then she could have screamed out a pre-assigned emergency phrase. Her cell phone would then automatically contact the local authorities, indicating that a customer has verbally activated a distress call. Then, rescuers could have traced the GPS location of her phone, and discovered the crash site.

Eventually, the police would have obtained a warrant to view Tanya’s cell phone records. Those records would have revealed a cluster of cell phone “pings”, the first of which occurred on September 19, 2007, at 7:16AM, right up until the point where the phone’s battery was exhausted, indicating Tanya’s last known location. The police would have then followed those cell phone “pings”, and discovered Tanya’s crash site, leading to her rescue.

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**Reflections from Chapter 2: Naked in the Sunlight**

- (10<sup>pts</sup>) **2.** The concept of privacy has emerged as a major concern among users of popular search engines, and social media websites. Giant Internet companies, such as Google or Facebook, offer plenty of free tools and resources, in exchange for their users' personal information. Do you consider this to be an acceptable tradeoff? Explain.

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| 10 pts |
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*Solution:* The following is a sample answer based on the opinions of the instructor.

Facebook's business model is built upon the concept of selling highly targeted advertising space on their website. Companies, corporations and organizations are incredibly eager to reach their customers using any means possible, and with much of their customers' attention being focused on Internet sites, it makes sense that their advertisements should gravitate towards that area. The kinds of resources that Facebook offers to its users are: an online social media presence, the ability to connect with their friends, family, and colleagues, and a venue in which to share photos and videos.

The major issue that is beginning to emerge with Facebook, is that it is devoting a larger share of its technological resources towards its advertisers(who are its customers), and paying less attention and focus towards its users(who happen to be its product). The public-facing part of the website used to be clean, intuitive and functional. However, in recent years, as the demand for larger profits has become greater, the user interface has become awkward, difficult to navigate, and cluttered with advertisements. Furthermore, Facebook has developed a ravenous appetite for its user's personal information. Collecting large quantities of detailed personal information translates directly into higher profits. However, this comes at the expense of its users, who are becoming increasingly uncomfortable with such an arrangement.

A significant number of Internet users are becoming disillusioned with this notion of trading away their personal information, and are actively taking steps against it. One particularly revealing sign is that Facebook's global user growth has slowed drastically in recent years, and amongst younger users, that growth is downright stagnant. Furthermore, a considerable number of their current users are simply abandoning the website, logging off from their Facebook account and never returning again.

Even though these large Internet companies repeatedly assure their users that their personal information will never be subject to abuse, there's no guarantee that such an assurance will extend into the future. The possibility remains, however slight, that the photos, videos, and opinions that constitute a user's profile could somehow be used against them. Nobody wants to be haunted by their past transgressions, and nobody knows the manner in which future adversaries will conduct their attacks. People are beginning to realize this, and they are beginning to err on the side of caution by withholding their personal data.

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**Reflections from Chapter 3: Ghosts in the Machine**

- (10 pts) 3. Consider the decision by the Commonwealth of Massachusetts to adopt the “OpenDocument Format” (ODF) for all of their documents, rather than using the conventional Microsoft Office Format (DOC). What were some of the perceived benefits that the government administrators Kriss and Quinn cited in making this switch? Do you think that Microsoft’s lawyers made a compelling argument against this proposal? Explain.

10 pts

*Solution:* The following is a sample answer based on the opinions of the instructor.

Massachusetts’ Finance Secretary, Eric Kriss, probably grew weary of having to pay exorbitant licensing fees to Microsoft, for the relatively simple and straightforward purpose of storing state documents. Seeking a better and less costly alternative, he proposed that the state adopt the “OpenDocument Format” for all public and state-related documents. The major upside to this proposal was that users would no longer need to purchase an expensive Microsoft Office application to view and edit these documents. Zero-cost, open source document editors would be made available, and if any company wanted to produce a premium editor application for these documents (including Microsoft), then they were free to do so.

Mr. Kriss had another compelling reason for making such a bold and progressive change: it would better serve the public interest. State documents should be made available to as many of its residents as possible, rich and poor alike. Access to public documents should not be *de facto* limited to only those users who can afford an expensive, proprietary software application. Switching to an OpenDocument Format initiative, Kriss argued, would significantly lift such barriers.

Microsoft’s lawyers, to their credit, did come up with a compelling counterargument to Kriss’ proposal, in that the disabled would be effectively blocked from accessing documents in ODF format. They argued that the kinds of accessibility software that the disabled rely on, such as screen readers, were simply not integrated into the ODF system. In order to guarantee access for disabled users, and to fully comply with state disability laws, state documents would have to remain in DOC format.

While I sympathize with the plight of the disabled, I feel that Mr. Kriss should have fought harder to seek some sort of compromise. I’m sure that it is daunting to come up against Microsoft’s powerful lobbying arm in such a high-stakes political game, but there must have been other, more practical technological solutions that could have been pursued. Perhaps Mr. Kriss could have commissioned a software company to develop an application that would have addressed these accessibility issues.

Regardless, it seems that Massachusetts has since abandoned its attempt to provide open source access to its documents. Perhaps in time, state legislators can revisit the matter, and find ways to overcome such roadblocks.

10 pts