

Beijing National Day School
Department of Mathematics

AP Computer Science Principles

Test 2: Lists and Dictionaries

English Name: _____

Pinyin Name: _____

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Exam Record

Part1 _____ / 20 pts

Part2 _____ / 15 pts

Part3 _____ / 12 pts

Total: _____ / 47 pts

Grade: _____

Part I: Multiple Choice (20 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. For the following list, how would you print out "Sally"?

1 pt
- ```
friends = ["Joseph", "Glenn", "Sally"]
```
- print friends[3]  
 print friends['Sally']  
 print friends[2]  
 print friends[2:1]
- (1<sup>pt</sup>) 2. 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)
- (1<sup>pt</sup>) 3. 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
- (1<sup>pt</sup>) 4. 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
- (1^{pt}) 5. 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]

- (1<sup>pt</sup>) **6.** Which list method adds a new item to the end of an existing list?
- `add()`
  - `append()`
  - `index()`
  - `push()`
- (1<sup>pt</sup>) **7.** What will the following Python code print out?
- ```
friends = ["Joseph", "Glenn", "Sally"]
friends.sort()
print friends[0]
```
- Glenn
 - Joseph
 - friends
 - Sally
- (1^{pt}) **8.** Which of the following Python functions deletes an element from a list?
- `push()`
 - `pop()`
 - `invalidate()`
 - `split()`
- (1^{pt}) **9.** Which of the following Python functions breaks a string into a list of words?
- `split()`
 - `join()`
 - `remove()`
 - `extend()`
- (1^{pt}) **10.** What task does the following Python code perform?
- ```
for num in range(1, 10, 2):
 print num
```
- 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]
- (1<sup>pt</sup>) **11.** What is the purpose of the second parameter of the `get()` method for Python dictionaries?
- It signifies a key which must be placed in the dictionary.
  - It specifies a unique key that the programmer wishes to retrieve.
  - It indicates the particular value that the programmer wants to retrieve.
  - To provide a default value if the key(from the first parameter of the `get()` method) does not exist in the dictionary.

- (1<sup>pt</sup>) **12.** How are Python dictionaries different from Python lists? 

|      |
|------|
|      |
| 1 pt |
- Python lists can store multiple values, whereas Python dictionaries store a single value.
  - Python lists can store strings, while Python dictionaries can only store words.
  - Python lists are indexed using integers, whereas Python dictionaries are indexed with any immutable data type.
  - Python dictionaries are mutable, while Python lists are immutable.
- (1<sup>pt</sup>) **13.** What would be the output produced by the following Python code? 

|      |
|------|
|      |
| 1 pt |
- ```
fruit = {"banana":5, "pear":3, "orange":8}
result = fruit["kiwi"]
print(result)
```
- 0
 - This program would fail with a traceback.
 - kiwi
 - 1
- (1^{pt}) **14.** What would be the output produced by the following Python code?

1 pt
- ```
fruit = {"banana":5, "pear":3, "orange":8}
result = fruit.get("kiwi", 0)
print(result)
```
- 0
  - This program would fail with a traceback.
  - kiwi
  - 1
- (1<sup>pt</sup>) **15.** Consider the following Python code, in which we loop through a dictionary. What are the items that the for loop iterates through? 

|      |
|------|
|      |
| 1 pt |
- ```
fruit = {"banana":5, "pear":3, "orange":8}
for item in fruit:
    print(item)
```
- The keys in the dictionary.
 - The integers in `range(0, len(fruit))`
 - The values in the dictionary.
 - All of the mutable data types in the dictionary.
- (1^{pt}) **16.** Which of the following Python methods would you use to create a separate and distinct copy of a dictionary?

1 pt
- `double()`
 - `duplicate()`
 - `copy()`
 - `clone()`

- (1^{pt}) 17. Consider the following Python dictionary:
- ```
fruit = {"banana":5, "pear":3, "orange":8}
```
- Which of the following statements would correctly remove the key-value pair "orange":8 from this dictionary?

- remove.fruit["orange"]  
 eliminate("orange":8)  
 del fruit[8]  
 del fruit["orange"]

1 pt

- (1<sup>pt</sup>) 18. What would be the output produced by the following Python code?

```
drinks = {"coffee":87, "tea":23, "juice":49}
result = drinks.values()
print(result)
```

(78, 32, 94)  
 [("coffee",87), ("tea",23), ("juice",49)]  
 ["coffee", "tea", "juice"]  
 [87, 23, 49]

1 pt

- (1<sup>pt</sup>) 19. Consider the following Python dictionary:

```
fruit = {"banana":5, "pear":3, "orange":8}
```

Which of the following Python statements would correctly subtract 2 from the value corresponding to the key "orange"?

- fruit["orange"].reduce(2)  
 orange subtraction 2  
 fruit.orange.minus.2  
 fruit["orange"] -= 2

1 pt

- (1<sup>pt</sup>) 20. Consider the following Python dictionary:

```
cheese = {"swiss":3, "cheddar":7, "gouda":6}
```

Which of the following Python statements indicates whether "swiss" appears as a key in the dictionary cheese?

- cheese.excludevalue("cheddar", "gouda")  
 "swiss" in cheese  
 cheese.containsvalue("swiss")  
 cheese --> "swiss"

1 pt

4 pts

**Part II: Short Answer** (15 points)

- Solve each of the following short answer questions. Write your solution in the corresponding box labelled, “Answer:”.

- (1<sup>pt</sup>) 1. What is the output of the following code:  
`cheeses = ["Cheddar", "Edam", "Gouda"]  
print(cheeses[0])`  
Answer:
- (1<sup>pt</sup>) 2. What is the output of the following code:  
`print([0] * 4)`  
Answer:
- (1<sup>pt</sup>) 3. What is the output of the following code:  
`snacks = ["pizza", "burger"]  
snacks.append("fries")  
print(snacks)`  
Answer:
- (1<sup>pt</sup>) 4. What is the output of the following code:  
`drinks = ["tea", "soda", "cola", "juice"]  
drinks.sort()  
print(drinks)`  
Answer:
- (1<sup>pt</sup>) 5. What is the output of the following code:  
`dinner = ["salad", "bread", "steak", "potato"]  
del dinner[1]  
print(dinner)`  
Answer:
- (1<sup>pt</sup>) 6. What is the output of the following code:  
`nums = [3, 41, 12, 9, 74, 15]  
print(max(nums))`  
Answer:
- (1<sup>pt</sup>) 7. What is the output of the following code:  
`food = {"pizza":3}  
food["fries"] = 10  
print(food)`  
Answer:
- (1<sup>pt</sup>) 8. What is the output of the following code:  
`treasure = {"gold":50, "silver":100}  
print("gold" in treasure)`  
Answer:

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

```
inventory = {
 "pocket":"lint",
 "canteen":"water",
 "pouch":"flint",
 "backpack":["shovel", "bedroll", "rope"]
}
print(inventory["backpack"])
```

Answer:

1 pt

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

```
fortune = {"gold":500}
fortune["gold"] += 50
print(fortune)
```

Answer:

1 pt

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

```
inventory = {
 "gold":500,
 "backpack":["xylophone", "dagger", "bedroll"]
}
inventory["backpack"].sort()
print(inventory["backpack"])
```

Answer:

1 pt

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

```
grocery = {"kiwi":5, "grape":12}
del grocery["kiwi"]
print(grocery)
```

Answer:

1 pt

(1<sup>pt</sup>) 13. Consider the following dictionary:

```
salad = {"caesar":1, "garden":2}
```

Write an assignment statement that modifies this dictionary to become the following:

```
salad = {"caesar":1, "vegetable":3, "garden":2}
```

Answer:

1 pt

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

```
singer = {"justin":"bieber", "taylor":"swift", "ed":"sheeran"}
print(singer.get("swift", "guitar"))
```

Answer:

1 pt

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

```
sports = {"tennis":43, "football":78, "badminton":52}
result = list(sports.keys())
print(result)
```

Answer:

1 pt

7 pts

**Part III: Python Programming** (12 points)

- Show all of your work. Remember that program segments are to be written in the Python programming language.

(3<sup>pts</sup>) 1. Consider the following partially completed function called `inventory()` that manages the total quantity of products in a grocery store. It contains two dictionaries:

- `prices` gives the cost of each product.
- `stock` indicates the quantity of each product in the store.

Complete the implementation of the function `inventory()` so that it returns the total value of all the products in the store. The function should return a `float`.

- If the following statements are executed, the output of your program should be: 129.5

```
result = inventory()
print(result)
```

```
def inventory():
```

```
 """
```

```
 returns a float, the total value of all the products.
```

```
 """
```

```
 prices = {"banana":4, "apple":2, "orange":1.5, "pear":3}
```

```
 stock = {"banana":6, "apple":7, "orange":31, "pear":15}
```

```
 # YOUR CODE HERE
```

|       |
|-------|
|       |
| 3 pts |

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| 3 pts |



## (3pts) 2. DNA to RNA Transcription

3 pts

- A strand of DNA is composed of a long sequence of molecules called nucleotides or bases. Only four distinct bases are used: *adenine*, *cytosine*, *guanine*, and *thymine*, which are respectively abbreviated as A, C, G, and T.
- An organism uses DNA as a model when constructing a complementary structure called RNA. The process of creating RNA from DNA is known as *transcription*. The RNA is then used to make proteins.
- RNA also consists of four nucleotides, three of them being A, C, and G, and a fourth one *uracil*, which is abbreviated as U.
- Transcription creates an RNA sequence by matching a complementary base to each original base in the DNA, using the following substitutions:

| DNA | → | RNA |
|-----|---|-----|
| A   | → | U   |
| C   | → | G   |
| G   | → | C   |
| T   | → | A   |

Consider the following partially completed function called `transcription(dna)`. It contains a single dictionary called `mapping` which gives each DNA base, and its corresponding RNA substitution:

```
mapping = {"A":"U", "C":"G", "G":"C", "T":"A"}
```

Complete the implementation of the function `transcription(dna)` so that it returns the transcribed RNA which corresponds to the DNA sequence being read in by the parameter `dna`. The function should return a string.

- If the following statements are executed, the output of your program should be:  
UCCGAUGCA

```
result = transcription("AGGCTACGT")
print(result)
```

Write your answer on the next page.

3 pts

**def** transcription(dna):

"""

*dna*, a string representing a DNA sequence

returns a string, the transcribed RNA sequence

"""

mapping = {"A": "U", "C": "G", "G": "C", "T": "A" }

(6pts) 3. Numbers in Mandarin follow 3 simple rules:

- There are words for each of the digits from 0 to 10.
- For numbers 11 to 19, then number is pronounced as “ten digit,” so for example, 16 would be pronounced(using Mandarin) as “ten six.”
- For numbers between 20 and 99, the number is pronounced as “digit ten digit,” so for example, 37 would be pronounced(using Mandarin) as “three ten seven.” If the digit is a zero, it is not included.

Consider the following partially completed function called `convert_to_mandarin(eng)`. It contains a single dictionary called `nums` which expresses the Mandarin translation for each of the numerical digits from 0 to 10:

```
nums = {"0": "ling", "1": "yi", "2": "er", "3": "san", "4": "si",
 "5": "wu", "6": "liu", "7": "qi", "8": "ba", "9": "jiu", "10": "shi"}
```

Complete the implementation of the function `convert_to_mandarin(eng)` so that it converts an English number(between 0 and 99), **given as a string**, into the equivalent Mandarin. The following Python statements demonstrate the expected outputs from this function:

- `print(convert_to_mandarin("36"))` will return `san shi liu`
- `print(convert_to_mandarin("20"))` will return `er shi`
- `print(convert_to_mandarin("16"))` will return `shi liu`

Write your answer on the next page.

|       |
|-------|
|       |
| 6 pts |

|       |
|-------|
|       |
| 6 pts |

```
def convert_to_mandarin(eng):
 """
 eng, a string representing an English number 0 to 99
 returns the string mandarin representation of eng
 """
 nums = {"0": "ling", "1": "yi", "2": "er", "3": "san", "4": "si",
 "5": "wu", "6": "liu", "7": "qi", "8": "ba", "9": "jiu", "10": "shi"}
 # YOUR CODE HERE
```