85.5

AAI/CPE/EE 551 Section B; Spring 2023 Midterm Prof. Kevin Ryan

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**Question 0** *(0 points)* I understand this is a closed notes and closed book exam. I also understand that I should not access the Internet during this exam. I also understand I am not to access the course lecture notes, assignments, solutions, or any other resources other than a calculator. I also understand that I am not to access any Python development tool (IDLE, PyCharm, and others). I pledge that I have followed all these instructions and that I have worked alone on this exam.

If this statement is true, please sign your name. Alex Gaskins

**Question 1** *(5 points)* What is the value of N after this code is executed?

```
>>> L = [1, 2, 3, 4, 5, "a", "b", "c", "d", "e"]
>>> M = ["xyz", "abc", 6]
>>> N = L[:3] + M[1:] + [L[-2]] + [2*L[4]] + [3*M[1]]
```

L[:3] = 1,2,3 [2*L[4]]=[5,5]
M[1:] = "abc", 6 [3*M[1]]=["abc","abc","abc"]
[L[-2]] = ["d"]

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N=[1,2,3,"abc",6,["d"],[5,5],["abc","abc","abc"]]

**Question 2** *(3 points)* What is the value (the contents) of the string S after the following Python statements are executed? Select the correct answer from the given choices.

```
S = "Go Ducks!"
S.replace("Duc", "XYZ")
```

a) 'Go XYZks!'

0

b) 'Go Ducks!'

c) Python Error Statement

d) None of the given answers

**Question 3** *(10 points)* You are given the following list L.

```
>>> L = ["app", "dog", "cat", "Stevens", "android", "apple"]
```

Write a one-line Python list comprehension which will print a list of all words in L which begin with the letter 'a'. The output should be:

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['app', 'android', 'apple']

Do not use the built-in Python functions filter and range. You should write a one-line Python list comprehension.

A=[i for i in L if i[0:]=="a"]

↑ First letter of string only

**Question 4** *(4 points)* You are given the following Python statements.

```
>>> L = [1, 2, "abc", 7, "xyz"]
>>> M = L
>>> N = L[:]
>>> M[2] = "xxx"
```

PART A: What is the value (the contents) of L after the above statements are executed?

4

L = [1, 2, "xxx", 7, "xyz"]

PART B: What is the value (the contents) of N after the above statements are executed?

N = [1, 2, "abc", 7, "xyz"]

**Question 5** *(5 points)* You are given the following information on American baseball teams.

| Team ("Key") | League (Value") |
|---|---|
| Yankees | American |
| Mets | National |
| Dodgers | National |

You are now asked to make a Python dictionary for these three American Baseball teams using the above table. The *team* is the dictionary key, and the *league* is the dictionary value. The name of the dictionary is to be baseball. Please enter your Python code below to make a Python dictionary named baseball for the three teams in the above table. Note: do not use the Python built-in zip function to make this dictionary. Thank you.

3

```
createDict (**args)
baseball = createDict("Yankees" = "American",
print (baseball)          "Mets" = "National",
                          "Dodgers" = "National")
```

Should be on one line, sorry for my poor word placement...

**Question 6** *(2 points)* Using the Python dictionary baseball from the previous problem, write the Python expression to fetch (return) the league for the Dodgers.

2

baseball ("Dodgers") # returns value for key "Dodgers"

**Question 7** *(5 points)* This question examines an alternate way of making a Python dictionary.

You are now given two lists:
teams = ["Yankees", "Mets", "Dodgers"]
league = ["American", "National", "National"]

Using the Python built-in function zip and the two given lists, make a Python dictionary named baseball with the team as the dictionary keys and the league as the dictionary values.

5

baseball = dict(zip(teams, league))

**Question 8** *(4 points)* You are given the following tuple, T.

T = ("abc", "xyz", [1, 2, 3])

Which of the following Python statement(s) will result in a Python error? Select all correct answer(s) from the given choices.

(a) T[1] = "efg"

b) T = (4) + T[1:]

c) T + (4, 5)

d) T.append("hij")

(e) T[2][1] = 7

0

# tuple values are [redacted] unchangeable ...

... but add/remove is okay

**Question 9** *(5 points)* Determine the output of mystery1(2,5).

```
def mystery1(x, y):
    a = x * y
    b = y // x
    c = x % y
    d = (x + y) % 4
    e = (a // d) * (b % (c + 1))
    answer = 0
    for i in range(1, e, b):
        answer = answer + 2*i
    return answer
```

# 2×5 = a = 10
# 5//2 = b = int = 2
# 2 mod 5 = c = 3
# 7%4 = d = 3
# (10/3) × (2 mod 4) = 3 × 2 = 6 = e

Note: for partial credit, please show the values for the variables a, b, c, d, and e.

4.5

a = 10 b = 2 c = 3 d = 3 e = 6

```
answer = 0
for i in range(1,6,2):  # 1 to 5, increment by 2
    answer = answer + 2*i  # loop1 → i = 1, answer = 2; loop2 → i = 3, answer = 8;
return answer  # answer = 18
```

loop3 → i = 5, answer = 18

**Question 10** *(4 points)*

PART A:

The following Python statement results in 80.

```
x << 2
```

80 >> 2 { 10100 → 20
10100000 → 64 + 16 = 80

What is the value of the variable x?

4

x = 20

PART B: What is the output for the following Python statements when executed?

```
x = 25
y = 9
(x << 2) / (y >> 2)
```

# 11001 → 25; 1100100 → 64 + 32 + 4 → 100
# 01001 → 9; 00010 → 2
# 100/2 = 50

**Question 11** *(4 points)* You are given two Python sets, Basketball and Volleyball. The set Basketball contains the names of students on the university basketball team. The set Volleyball contains the names of students on the university volleyball team. It is possible for a student to be a member of both teams. All your answers should use Python set notation and operators.

Part A:
Write the Python expression which will determine the students who are on both the basketball and the volleyball team.

```
Basketball & Volleyball # intersect
```

1

Part B:
Write the Python expression which will determine the basketball players who are not volleyball players.

```
for p in Basketball:
    if p & Volleyball: continue
print(p)
```

0

Part C:
Write the Python expression which will answer the following question: Are all volleyball players also basketball players?

```
Basketball == Volleyball
```

0

Part D:
Write the Python expression which will result in a set of all players on either the basketball or volleyball team.

```
Basketball | Volleyball # union
```

1

**Question 12** *(4 points total)* The following function returns [[10, 11], ['K', 22]]. Modify the indicated lines of code so the function will return [[10, 11], [21, 22]].

```
def Question_2():
   # TO DO NUMBER 1: add a line of code here
   L = [ [10, 11], [21, 22]]
   M = L #TO DO NUMBER 2: modify this line
   L[1][0] = "K"
   return M
```

**Please enter your answers below:**

4

- **For TO DO NUMBER 1:** import copy
- **For TO DO NUMBER 2:** M = copy.deepcopy(L)

**Question 13** *(5 points)* What is the output for the following Python statements when executed?

```
x = 16
while x > 9:
   x = x -1
   if x % 4 == 0:
      print(x)
   else:
      print("Hello")
else:
   print("Done")
```

5

Hello
Hello
Hello
12
Hello
Hello
Hello
Done

**Question 14** *(5 points)* What is the output for the following Python statements when executed?

```
y = 10
while y != 0:
    y = y -1
    if y % 3 == 0:
        print(y)
    elif y == 4:
        break
    else:
        print("Hello")
else:
    print("Done")
```

4

9
Hello
Hello
6
Hello
3
Hello
Hello
Hello
Done

**Question 15** *(5 points)* What is the output for the following Python statement when executed?

{i * 2 for i in ['a', 'z', 'b', 'a']}

5

{'aa', 'zz', 'bb'} # set, so no duplicates ('aa')

**Question 16** *(5 points)* You are given the following list, L.

L = [1, 2, 3, 4, 5]

Part A: Obtain an iterator object from the iterable L. Assign this iterator object to the variable X. Thus, complete the following: *(3 points)*

X = iter (L)

5

Part B: Using the variable X (the iterator object), write two Python statements which will produce the first two iteration results. (For this given list, the first two iteration results are 1 and 2. Write two Python statements. The first statement will produce the result 1 and the second statement will produce the result 2. *(2 points)*

X.__next__ # 1
X.__next__ # 2

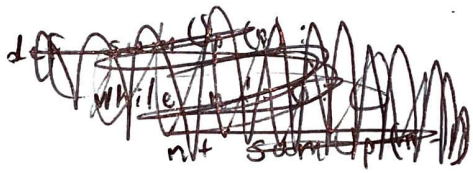
**Question 17** *(10 points)* Write a function called sumUp(n) that takes an integer n (which is greater than or equal to 0) as input and returns the sum of the integers from 0 to n inclusive. Write sumUp(n) using recursion. (You must use recursion).

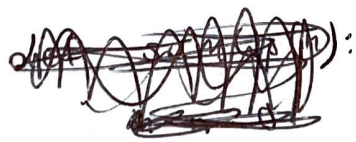
Sample outputs:

```
>>> sumUp(3)
6

>>> sumUp(0)
0

>>> sumUp(6)
21
```





10

```
def sumUp(n):
    if n == 0:
        return 0
    else:
        return n + sumUp(n-1)
```

**Question 18** *(15 points total)* This question examines the application of the advanced functional programming tools in Python (map, reduce, filter). Use only these tools and a lambda function to answer each of the following questions. Do not use recursion.

Part (a) *(5 points)* You are given a list, L. This list contains only integers and letters of the alphabet. Using map and lambda, write a one-line Python statement which will multiply all integers in the list by two and will repeat all letters.
Sample list, L:
L = ['a', 8, 10, 'b', 'c']

Correct output:
['aa', 16, 20, 'bb', 'cc']

5

```
L.map(lambda d: d*2) # apply lambda function to every item in the list
```

Part (b) *(5 points)* Using filter and lambda, write a one-line Python statement which will select all numbers in a list L which are less than the first number in the list L. List L contains only integers. The result should be in a list.
Sample list, L:
L = [4, 1, 2, 3, 4, 5, 6, 7, 8]

5

Correct output:
[1, 2, 3]

```
L.filter(lambda d: d < L[0])
```

Part (c) *(5 points)* Using reduce and lambda, write a one-line Python statement which will determine the minimum of all numbers in a list L. List L contains only integers.
Sample list, L:
L = [10, 9, 19, 23, 14, 7]

Correct output:
7

**Please note: you can assume that reduce has been imported by the following Python statement**
**>>> from functools import reduce**
**A big hint. You may find the following helpful.**
**a if a < b else b**

4

```
L.reduce(lambda a,b: a if a<b else b)
```