COMP0015: Introduction to Programming T2 (22/23)

Sample Test Feb/2023

Name and ID: _____

1. DURATION: 1 HOUR
2. Do not remove this question sheet from the room.
3. Calculators are not allowed. Textbooks and other materials are not allowed.
4. Students may leave the room by raising their hand. They will not be allowed back into the room.
5. All phones must be turned off and there must be silence during the test.
6. This exam is out of 40 marks in total. Total time is one hour. The number of marks roughly corresponds to the difficulty of the problem. Good luck!

1. 4 Marks (Output)

What is the last line of output produced by the code snippet below?

```
i = 0
total = 0
while total < 0 :
 i = i + 1
 total = total - i
 print(i, total)
```

(a) 0 0

(b) 1 1

(c) No output

(d) 0 -1

2. 4 Marks (Periscope)

These three programs are quite similar, but not identical. Do they print the same thing, or do some give different output? Please show the output for each program. (2 marks each)

Program 1:

```
def foo(x):
    x = x + 1
    print(x)
x = 100
print(x)
foo(x)
print(x)
```

Program 2:

```
def foo(y):
    x = y + 1
    print(x)
x = 100
print(x)
foo(x)
print(x)
```

Program 3:

```
x = 100
def foo(y):
    x = y + 1
    print(x)
print(x)
foo(x)
print(x)
```

Name:

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3. 6 Marks (Code tracer)

Listing 1 defines the function `g(s)`, where `s` is a string.

```
1  def g(s):
2      str_len = len(s)
3      half_len = int(str_len/2)
4
5      count = 0
6      i = 0
7      not_broken = True
8      while i < half_len and not_broken:
9          if s[i] == s[str_len-i-1].lower():
10             count += 1
11         else:
12             not_broken = False
13         i += 1
14
15     return count
```

LISTING 1: Function g.

What is the output for the following function calls:

1. `g("Abab")` _____
2. `g("redivider")` _____
3. `g("rAcecaR")` _____

4. 6 Marks (Lowering Equality)

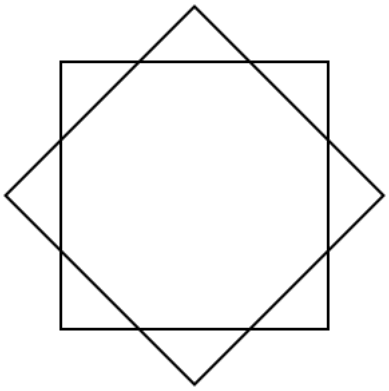
Write a function `remove_eq(nums, n)` that accepts an one-dimensional list of integers *nums* and an integer number n as parameters and returns a list in which all integers that are equal n removed, with those integers that remain maintaining the same order.

Here are some example calls to the function and expected return results:

Function call	Value returned
`remove_eq`([18, 7, 8, 34, 8, 8, 23], 8)	[18, 7, 34, 23]
`remove_eq`([8, 8, 8], 8)	[]
`remove_eq`([18, 7, 8, 34, 8, 8, 23], 38)	[18, 7, 8, 34, 8, 8, 23]

Name:

5. 6 Marks (Shredder's Revenge)



Write turtle code to draw the above square-and-rotated-square. The squares should have width of 100 pixels.

6. 6 Marks (Cerberus)

Write a function called `three_heads` that repeatedly flips a coin until 3 heads are thrown. Each time a coin is flipped, the function will print H for heads or T for tails. You will use the `random.randint()` function to generate a value for either heads or tails. When 3 heads in a row are thrown, the function should print a message congratulating the user and should terminate. Here is one possible output when calling the function:

```
H H T H H T H T T H T T T H H H
Congratulations! 3 heads in a row.
```

7. 8 Marks (Subset String)

Write a function `is_all_char_in` that accepts two strings as parameters. If all characters of the first string are in the second string, `is_all_char_in` returns 1; otherwise, it returns 0. Your function should be *case insensitive*, that is, it should ignore differences between upper- and lower-case.

Here are some example calls to the function and the results we expect to be returned:

Function call	Value returned
`is_all_char_in`(“wHol”, “Hello world”)	1
`is_all_char_in`(“eo2u”, “Hello world”)	0
`is_all_char_in`(“whol”, “Hello world”)	1
`is_all_char_in`(“wHoooo elHd”, “Hello world”)	1
`is_all_char_in`(“”, “Hello world”)	1
`is_all_char_in`(“Hello World”, “Hello world”)	1