

# CSCI 1200 Final Practice (C,D, E)

By: Dr. Ming Ming Tan. Not to be sold, published, or distributed without the authors' consent.

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Name: \_\_\_\_\_

Scores:        /30

## Instructions

This is a closed-book exam, without notes, books, or electronic devices.

A document (Python cheatsheet) that provides basic guide to Python syntax is attached at the back of this document.

The duration of the exam is 1hr50 minutes.

Take your time to read the statements carefully before trying to answer them.

When writing code, make sure your special punctuation characters are legible, and your lowercase and uppercase letters are easy to distinguish.

There are in total 15 questions and one bonus question. The weight of the Final exam is 30%. Each question contributes equal points.

The bonus question contributes an additional 3 points that count towards the final score.

Please only attempt the bonus question (optional) after completing all the other questions.

Please note that the number of lines given to you in the code block does not reflect the number of lines of code you need to write.

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## Question 1

Consider the following function.

```
def mean_square_diff(x,y):  
    return (x**2-y**2)/2
```

What is the value of `square_diff(3,5)`?

- (a)  $\frac{3^2-5^2}{2}$
  - (b)  $(3 \times 2 - 5 \times 2)/0.5$
  - (c)  $3^2 - \frac{5^2}{2}$
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## Question 2

Complete the following function `sum` that takes three numbers `x`, `y`, `z` and returns the sum of them.

```
def sum(x,y, z):
```

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## Question 3

Assume an `int` variable named `num` is already initialized to some value.

Which of the following values of `num` will result in `num%2==0` or `num%3==0` be evaluated to `True`?

Select all that apply.

- ☐ (a) 2
  - ☐ (b) 3
  - ☐ (c) 6
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## Question 4

Consider the following function where `text` is a string of length 1.

```
def test(text):
```

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```
result = 0
if text == "X":
    result+= 10
else:
    result+= int(text)
return result
```

What is the output of:

- (i) `test("X")`
  - (ii) `test("0")`
  - (iii) `test("9")`
- 
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## Question 5

Complete the following function `test` that takes `text` as input where `text` is a string represents a digit or an alphabet from "A" to "C". Each character in the string corresponds to an integer value.

- "A" corresponds to 10
- "B" corresponds to 11
- "C" corresponds to 12
- "0" corresponds to 0, "1" corresponds to 1, ..., "9" corresponds to 9.

The function returns the sum of the integer values represented by each character in the string `text`.

Note: The parameter `text` only takes the values "0", "1", ..., "9", "A", "B", "C".

```
def test(text):
```

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## Question 6

Consider the following function `test` that takes a string `text` as input.

```
def test(text):  
    if text[0] == "0":  
        return "1" + text  
    else:  
        return text + "1"
```

What is the output of the following?

- (a) `test("01")`
  - (b) `test("10")`
  - (c) `test("001")`
- 
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## Question 7

Consider the following program:

```
password = ""  
while (len(password)<6):  
    password = input("Enter a new password")
```

In this program, the user will be prompted to make an input. Choose all that apply.

- ☐ (a) If user's input is "123456", the loop will terminate.
  - ☐ (b) If user's input is "12345", the loop will terminate.
  - ☐ (c) This program can be rewritten using a for loop.
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## Question 8

Consider the following function

```
def test(L):  
    for i in range(len(L)):  
        if L[i]>L[i-1]:  
            return False  
    return True
```

What is the output of `test([1,2,3])`? If there is an error, explain in detail what the error is.

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## Question 9

Consider the following function, where `L` is assumed to be a list of integers.

```
def test(L):  
    result = 0  
    for x in L:  
        if x%2==0:  
            result+=1  
    return result
```

What is the value of

- (i) `test([1, 2, 3, 4, 5])`
  - (ii) `test([3, 6, 12])`
  - (iii) `test([2,4,8])`
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## Question 10

Consider the `test` function in Question 9.

Which of the following statements are correct. Select all that apply.

- (i) If the input list `L` contains only even integers, then `test(L)` will always return `-1`.
- (ii) The function `test` takes an input list of integers and returns the sum of all numbers in the list that is a multiple of 2.
- (iii) The function `test` takes an input list of integers and returns the number of elements in the list that is a multiple of 2.
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## Question 11

Consider the following function.

```
def test(n):  
    result = 0  
    while n>0:  
        result+=1  
        n=n/2  
    return result
```

What is the output of the following:

- (i) `test(0)`
- (ii) `test(4)`
- (iii) `test(6)`
- 
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## Question 12

Complete the following function `compute_check_digit(b)` that takes an input binary string `b` of length 10 and compute the following value:

$$\sum_{i=0}^9 (10 - i) b_i \bmod 10$$

where  $b_i$  is the  $i$ -th bit of `b`.

```
def compute_check_digit(b):
```

## Question 13

Implement the function `integer_square_root(n)` that takes an input integer `n` and returns the square root of `n`. The function should implement binary search for the square root of `n` as follows:

1. Set `start` to 0 and `end` to `n`.
2. Run an iteration as long as `start` is less than or equal to `end`.  
In each iteration, do the following:
  - a. Take the middle `m` of `start` and `end`.
  - b. If  $m^2$  is equal to `n`, then return `m`.
  - c. Else if  $m^2 < n$ , set `start` to `m+1`.
  - d. Else, set `end` to \_\_\_\_.
3. Return `result`.

```
def integer_square_root(n):
```

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## Practice Question 14

Complete the following function `remove_digits(text)` that takes a string `text` and returns a copy of `text` for which the occurrence of all digits in `text` is removed.

You may use the following method `text.replace(c, "")` which replace every occurrence of `c` in `text` with the empty string. In other words, `text.replace(c, "")` creates a copy of `text` for which all occurrence of `c` has been removed.

Hint:

1. Iterate `c` over elements in \_\_\_\_.
2. In each iteration, set `text` to be equal to the result of removing all occurrence of `c` in `text` (use `text.remove(c)`).
3. Return `text`.

```
def remove_digits(text):
```

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## Practice Question 15

Write the function `double(L)` that takes a list `L` of integers and double the values in `L`. The replacement should be done in-place, and not by creating a new list.

For example, if `L = [1, 2, 3]`, executing `double(L)` will return `None` but the value of `L` is not `[2, 4, 6]`.

```
def double(L):
```



