

BIRKBECK

(University of London)

MSc EXAMINATION FOR INTERNAL STUDENTS

MSc Computer Science

MSc Data Science

Department of Computer Science and Information Systems

Principles of Programming I

BUCI033S7

DATE OF EXAMINATION: Monday, 30th April 2018

DURATION OF PAPER: One Hour

WRITTEN — MOCK PAPER — EVENING

RUBRIC:

1. Candidates should attempt ALL 9 questions on this paper.
2. You are advised to look through the entire examination paper before getting started, in order to plan your strategy.
3. Simplicity and clarity of expression in your answers is important.
4. All programming questions should be answered using the PYTHON programming language.
5. Electronic calculators are **NOT** allowed.
6. START EACH QUESTION ON A NEW PAGE.

Question:	1	2	3	4	5	6	7	8	9	Total
Marks:	10	2	4	5	6	3	7	6	7	50

Question 1 Total: 10 marks

Given the following function:

```
(a) def letters(s):  
    ss = []  
    for ch in s:  
        if ch.isalpha():  
            ss.append(ch.lower())  
    return ss
```

4 marks

what is returned by the call `letters("1 and 2 and 3")` ?

(b) Given the following function:

1 mark

```
def f(n):  
    return [foo, points, letters, lets][n]
```

what is returned by the call `f(1)` ?

(c) Given the function

5 marks

```
def fiddle(index, lst):  
    index += 1  
    lst[index] += 1
```

what will be printed by

```
n, nums = 3, range(1, 6)  
fiddle(n, nums)  
print(n, nums)
```

Question 2 Total: 2 marks

What is the purpose of the following code in a Python program?

```
if __name__ == '__main__':  
    main()
```

Question 3 Total: 4 marks

Complete the code for the following function so it matches its documentation:

```
def doubleList(numberList):  
    ''' For each of the numbers in the list numberList, print a line  
        containing twice the original number. For example,  
        doubleList([3, 1, 5]) would print  
        6  
        2  
        10  
        '''
```

Question 4 Total: 5 marks

Assume that you have written a class `ListUtils` to provide a number of operations on lists. This class is in the file `listutils.py`. In the following three questions you will write a complete class to test one of the functions in `ListUtils`.

(a) Write the necessary import statements and the class header for a class named `ListUtilsTest`.

2 marks

- (b) Write a test, using `pytest`, for the function `duplicate(lst)` which is supposed to return a shallow copy of the list given as a parameter. 3 marks

Question 5 Total: 6 marks

The DRY (Don't Repeat Yourself) principle applies to both code and data.

- (a) Why is it a good idea not to copy and paste code, or otherwise duplicate code? That is, what problems result from having duplicate code? 3 marks
- (b) Why is it a good idea not to have the same information represented in more than one way? That is, what problems arise? 3 marks

Question 6 Total: 3 marks

Suppose you have a `class Robot(object)`, and you want to create a class to represent a dog robot. What is the difference between saying `class Dogbot(object)` and saying `class Dogbot(Robot)` ?

Question 7 Total: 7 marks

Compare and contrast *recursion* and *iteration*. When would you prefer one over the other and why? Provide appropriate examples to illustrate your answer.

Question 8 Total: 6 marks

Provide an English description of what the following function does:

```
import random
def points(n):
    directory = {}
    for i in range(0, n):
        pname = chr(ord('a') + i)
        x = 1000.0 * random.random()
        y = 1000.0 * random.random()
        directory[pname] = (x, y)
    return directory
```

Question 9 Total: 7 marks

Suppose you are defining a class `Circle`, and every object of this class must have three values: The `x` and the `y` coordinates of the circle's centre, and the radius of the circle.

- (a) Write the constructor that you would put in this class. 2 marks
- (b) Use the constructor you have written to create a circle named `unitCircle` with `radius = 1` and centre at the origin (`x = y = 0`). 5 marks