Birkbeck

(University of London)

BSc/FD EXAMINATION

Department of Computer Science and Information Systems

Introduction to Programming (BUCI007H4)

CREDIT VALUE: 15 credits

Summer 2019

Date of examination: XXXDAY ? MAY 2019
Duration of paper: 14:30 – 16:30

The programming language is PYTHON.

There are **ten** questions in this paper.

Answer all **ten** questions.

Each question carries **10** marks in total.

Calculators and other electronic devices are not permitted.

The examination is closed book.

No supplementary material is provided.

This paper is not prior disclosed.

The quote marks for strings are in this style "string" or 'string'.

1. (a) Which of the following would result in an error in Python and which wouldn't?
   A) print(" 'Once upon a time...", she said.')
   B) print("He said, 'Yes!' ")
   C) print('3\')
   D) print('That's okay.')
   E) print("string"**3)

   (b) Which of the following are accepted by the compiler as names of variables?
   A) 3times
   B) in
   C) __dollar__   (Two underscores, then dollar, followed by two underscores)
   D) _   (One underscore)
   E) true

2. Consider the following code.   (**10** marks)

   ```
   a = 2
   b = 7
   c = -3
   d = 4
   e = 4
   a = b - a * a
   b = b // 3 + 2 * c
   c = round(c ** 3 / 7, 2)
   d = 10 % d ** 3 ** 2
   e = abs(-14 + 34 / e)
   ```

   What are the values of a, b, c, d and e after the above code is executed?

3. (a) Explain what compile-time error, run-time exception and run-time error (but not an exception) are. Give an example for each category.   (**6** marks)

   (b) Write a function compare() that takes in two arguments. It returns 1 if the result of multiplying the first argument by 10 and then subtracting 38 from the result is strictly less than half of the second argument; and returns 0 otherwise.   (**4** marks)

4. (a) Write Python code to obtain the sqrt and cos functions from the math module.

(**1** mark)

(b) Write the following mathematical expression in Python   (**2** marks)

$$d = \sqrt{P^5 - (1 + cos(F) \div 100)}$$

(c) Write Python code to prompt the user with the string:

"Please enter the price of a loaf of bread:"

The input will represent the price of a loaf of bread and be assigned to the variable priceLoafBread. Note that the value of priceLoafBread should be of type float. If the number entered is strictly negative then set priceLoafBread to be 0 and include an error message.   (**2** marks)

(d) What is the value of priceLoafBread in your code if the user enters the following?

(**2** marks)

i)   Please enter the price of a loaf of bread: 5

ii)   Please enter the price of a loaf of bread: -4

(e) What is printed when the following code is run?   (**3** marks)

i)   `print("MALET"[-2] * 4 + 3 * "street"[2])`

ii)   `print(len("\"come\n on!\"\\"))`

iii)   `bbk = ["Birkbeck", "University", "London", "England"]`
      `print(bbk[-3][5])`

5. (a) percentage_w is a variable for the percentage of women in a population. Write down a reasonable print statement so that the output is of the following form:

The percentage of women: ∼∼percentage_w%.

Note that ∼ represents one space. There should be at least two spaces between "The percentage of women:" and percentage_w%. Round the value of percentage_w% to two decimal places.

For instance, if percentage_w = 54.8765, then the output will be
The percentage of women: ∼∼54.88%.

(**6** marks)

(b) The following is displayed by one or more calls to the print function.
tom
dick
harry

Write down two different ways to make one or more function calls to print, in order to produce this output (**4** marks)

6. (a) Give short English language descriptions of the relational operators $\geq$ and $<$. (**2** marks)

(b) Single characters are ordered such that the upper case letters come before lower case letters, numbers come before letters and the space character comes before all non-empty characters. Explain how this ordering for single characters can be extended to non-empty strings that contain letters or numbers or the space character, i.e. show how to decide whether a given non-empty string precedes or follows another non-empty string. (**4** marks)

(c) Evaluate the following expressions. In each case state whether the result is True or False.

   i)   "prefix" $<$ "postfix"
   ii)   "3pq" $<$ "3B47"
   iii) "car nation" $<$ "carnation"
   iv) "a43" $<$ "a49"

(**4** marks)

7. (a) The function call grade(m) returns "A" if the mark m is in the range 70 to 100, "B" if m is in the range 60 to 69, "C" if m is in the range 50 to 59 and "D" if m is in the range 0 to 49. Implement the function grade using a nested set of if statements. Use the if ... elif... else:... construction. (**6** marks)

   (b) Implement a second function grade1 that requests an integer m from the keyboard with the prompt "Please input an integer in the range 0 to 100". If an integer in the correct range is typed in then grade1 returns the same string value as the function grade. If an integer outside the correct range is typed in then grade1 prints the error message "Integer out of range" and returns the empty string. The function grade1 has no arguments. Suggestion: use a function call to grade from grade1, if appropriate. (**4** marks)

8. (a) Describe the action of the following code in a correct Python program.

```
i = 0
while i ≤ 0 :
    i = int(input("Input a strictly positive integer"))
print(i)
```

(**4** marks)

   (b) Revise the code in part (a) of this question such that the revised code allows no more than three attempts to input a correct value of i. The revised code prints the correct value of i if there is one, otherwise it prints "No further tries allowed". (**6** marks)

9. (a) State one advantage of using functions in programming. (**2** marks)

(b) What is a local variable in a function? (**2** marks)

(c) The function calculation is defined as follows.

```
def calculation(x, y) :
    v = x+y*y
    if v < 10 :
        return v
    else :
        return x
```

Identify the header and the body of the function calculation. (**2** marks)

(d) What is printed when the following code is executed after executing the code defining the function calculation in part (c) of this question. Justify your answer.

```
v = 10
print(calculation(1, 2))
```

(**4** marks)

10. (a) The list values is defined by values = [32, 54, 67, 1]. Show how an index can be used to access the entry 54 in values. (**1** mark)

(b) The variable values is as given in part (a) of this question. Which of the following statements can be executed correctly and which cannot be executed without error.

i) print(values[3])
ii) print(values)
iii) v = values[4]
iv) v = values[values[-1]]

(**4** marks)

(c) What is the value of n after the following code is executed in a correct Python program. Justify your answer.

```
friends = ["Harry", "Emily", "Emily"]
n = friends.index["Emily"]
```

(**2** marks)

(d) Write code to count the number of times the string "Emily" appears in a list ls of strings. It is not necessary to include the code in a function. (**3** marks)