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

DURATION OF PAPER: One Hour

Practical — Mock Paper — Four

RUBRIC:

1. Candidates should attempt ALL 4 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	Total
Marks:	6	18	12	14	50

Question 1 .... Total: 6 marks

Given a list of unique numbers, swap the minimal and maximal elements of this list, printing the resulting list.

Question 2 .... Total: 18 marks

Given a positive real number a and a non-negative integer n. Calculate a^n without using loops, $**$ operator, or the built in function `math.pow()`. Instead, use *recursion* and the relation $a^n = a \times a^{n-1}$.

(a) Write this function and name it, `power(a, n)`. | 12 marks |

(b) Write several unit tests using `pytest` which test your `power` function. You | 6 marks | should ensure that you include boundary tests in your set of tests.

Question 3 .... Total: 12 marks

Given a number n, followed by n lines of text, print all words encountered in the text, one per line. The words should be sorted in descending order according to their number of occurrences in the text, and all words with the same frequency should be printed in lexicographical order.

Question 4 .... Total: 14 marks

Each student at a certain school speaks a number of languages. We need to determine which languages are spoken by all the students, which languages are spoken by at least one student.

Given, the number of students, and then for each student given the number of languages they speak followed by the name of each language spoken,

(a) find and print the number of languages spoken by all the students, followed by a list the languages by name, then

(b) print the number of languages spoken by at least one student, followed by the list of the languages by name.

Print the languages in alphabetical order.