CSC1003 Assignment 4

OJ Access Code: ifu2@ydh2r

## Important Notes:

1. The assignment is an individual project, to be finished on one’s own effort.
2. The work must be submitted before 6pm Dec. 14, 2022 (Thursday), Beijing Time. This is a firm deadline. No late submissions are accepted.
3. Plagiarism is strictly forbidden, regardless of the role in the process. Notably, ten consecutive lines of identical codes are treated as plagiarism. Depending on the seriousness of the plagiarism, 30%-100% marks will be deducted.
4. The questions in the assignment are the same as two questions in previous assignments, while requiring to be finished with Python instead of Java.

## Marking Criterion:

1. There are three Python programs in this assignment, 45 marks each.
2. The maximum score of assignments 1 and 2 is 100 marks each. The maximum score of assignments 3 and 4 is 135 marks each. Meanwhile, the maximum total score of all four assignments for each student can’t exceed 400.
3. Each program will be evaluated with several unseen test cases. A program obtains the full score if and only if it passes all test cases.
4. According to the school policy, using AI will be regarded as academic dishonesty. If TA suspects that your code was generated by AI, you will be invited to an offline meeting and express your understanding of the assignment. Otherwise, you may receive a minimum grade.

## Running Environment:

1. The submissions will be evaluated in the course’s OJ system running **Python 3** and Linux platform.
2. All students will have an opportunity to test their programs in the OJ platform prior to the official submission.

## Submission Guidelines:

1. You will receive your grade only if you submit your code both on OJ and on bb on time. Latesubmission on bb leads to 10% mark deduction, and late submission on OJ leads to minimumgrade.
2. For bb submission, you need to directly upload your python file on bb. That is, your submission should be 3 “.py” files. Wrong submission format will receive 10% mark deduction.
3. Inconsistency with or violation from the guideline leads to marks deduction.
4. It is the students’ responsibility to read this assignment document and submission guidelines carefully and in detail. No argument will be accepted on issues that have been specified clearly in these documents.

## Program One:

(pascal.py) For a given input number **N** (1<= **N** <= 10), print out the first N levels of Yanghui’s (Pascal’s) triangle (<https://www.mathsisfun.com/pascals-triangle.html>).

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| Input Example: | Expected Output: |
| 5 | 1  1 1  1 2 1  1 3 3 1  1 4 6 4 1 |

Note: The input is an integer **N** between 1 and 10. The output is the first **N** levels of Yanghui’s triangle. In each line of the output, the numbers are separated by a space.

## Program Two:

(fibonacci.py) Fibonacci series is defined by:

1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, …

Write a Python program to read two non-negative numbers from theinput. Denote the two numbers by ***n*** and ***d***, and the program is expected to output ***d*** elements of the series from **n-th** element in the reverse order. An example is given below. (You can assume that the numbers are no larger than *100000*).

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| Input Example: | Expected Output: |
| 4  5, 3  7, 0  7, 7  7, 8 | 5, 3, 2  13, 8, 5, 3, 2, 1, 1  invalid |

Note:

1. The first line of each test case input will be an integer **N** (In the example above, **N** equals to 4). This integer **N** represents the number of lines of data to be input next.
2. Starting from the 2nd line, each line of the input consists of a positive integer, a comma, a space, and a non-negative number. The output is expected to be a series of numbers, separated by a comma and a space. If there is no number to output, the output is **an empty line**. If the input is not valid, the output is a string of “**invalid**”.

## Program Three:

(matmul.py)Write a Python program to calculate the product of two matrices of sizes and respectively. Each element of the input matrices is an integer. Therefore, the result matrix is an matrix with integer elements.

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| Input Example: | Expected Output: |
| 3 5 7  51 61 -2 66 66  61 33 25 -14 19  -17 -20 66 67 50  -3 23 28 25 31 12 14  11 -8 27 -8 25 9 12  36 32 10 4 6 28 22  30 37 23 -8 38 30 25  38 24 -1 -5 -8 -1 28 | 3 7  4934 4647 4507 -79 5074 3019 4900  1382 1877 2508 1378 2182 1290 1982  6117 5560 1135 -787 1515 3424 4049 |

Note:

1. The first line of the input is the size of the two input matrices. In this example, , each separated by a space. The following lines give the elements of the first matrix, and each line has space-separated numbers, which form the first input matrix. Then the following lines give the elements of the second matrix, and each line has numbers, which form the second input matrix.
2. The first line of the output is the size of the result matrix, i.e., and separated by a space. The following lines, each line having space-separated integers, give the elements of the result matrix.
3. The definition of matrix and matrix multiplication operation can be found in any linear algebra textbook, or from the following link: <https://en.wikipedia.org/wiki/Matrix_multiplication>
4. When testing the assignment, the values of are no more than 10.