CSC2003 Assignment 1 (Draft)

CSC2003 Teaching Group

January 16, 2024

Important Notes

1. The assignment is an individual project, to be finished on one's own effort.
2. The work must be submitted before 6p.m., Feb. 9th, 2024 (Friday), Beijing Time. 20% mark deduction will be given for late submission within 2 days, and 0 for even later;
3. Plagiarism is strictly forbidden, regardless of the role in the process. Notably, ten consecutive lines of identical codes are treated as plagiarism. Using AI to directly generate code will also be regarded as plagiarism. Depending on the seriousness of the plagiarism, $30\% - 100\%$ marks will be deducted.
4. Please let the teaching team know for any ambiguity or incorrectness in this draft.

Marking Criterion

1. The full score of the assignment is 300 marks.
2. Three java programs are to be submitted. Each program will be evaluated with several unseen test cases. A submission obtains the full score if and only if both programs pass all test cases.

Running Environment

1. The submissions will be evaluated in the OJ system running Java SDK 21. It is the students' responsibility to make sure that his/her submissions are compatible with the OJ system.
2. The submission is only allowed to import four packages of (java.lang.*; java.util.*; java.math.*; java.io.*) included in Java SDK. No other packages are allowed.
3. All students will have an opportunity to test their programs in the OJ platform prior to the official submission.

Submission Guidelines

1. You will get your grade only if you submit your code both on OJ and on bb on time.
2. For bb submission, you need to **directly** upload your java file on bb. That is, your submission should be *MathExpression.java*, *Pascal.java*, and *Prime.java*. Wrong submission format will receive 10% mark deduction.
3. Inconsistency with or violation from the guideline leads to marks deduction.
4. All students are reminded to read this assignment document carefully and in detail. No argument will be accepted on issues that have been specified in this document.

Program

There are 3 independent programs in this assignment, and each is worth 100 points.

MathExpression

Write a java program named "MathExpression.java" to evaluate mathematical expressions with two operands (nonnegative integers) and one operator (+, -, *, or /). The first line of each test case input will be an integer N. This integer N represents the number of lines of data to be input next. Then each following row of the input consists of a non-negative integer a, a space, an operator, a space, and another non-negative integer b. The output of each row is an integer (round down).

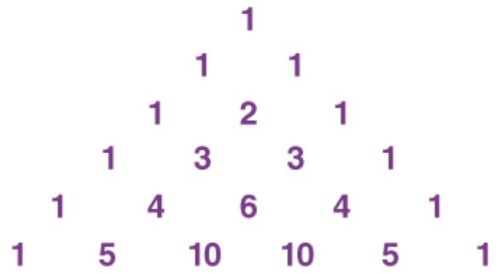
For all test cases, $1 \leq N \leq 20, 0 \leq a, b \leq 1000$.

An example of console input	Expected console output
7 3 + 2 4 * 4 3 - 5 155 / 5 157 / 5 158 / 5 0 + 7	5 16 -2 31 31 31 7

Pascal

Pascal's Triangle is the triangular arrangement of numbers that gives the coefficients in the expansion of any binomial expression. The numbers are so arranged that they reflect as a triangle. Firstly, 1 is placed at the top, and then we start putting the numbers in a triangular pattern. The numbers which we get in each step are the addition of the above two numbers. It is similar to the concept of triangular numbers.

Below is a draft of the triangle.



Write a program "Pascal.java" that takes an integer N as input, and outputs the Pascal's Triangle with size N (i.e. the triangle with N lines). In each line of the output, elements are separated with a space.

For all test cases, $1 \leq N \leq 15$.

An example of console input	Expected console output
4	1 1 1 1 2 1 1 3 3 1

Prime

An integer N ($N \geq 2$) is a prime if and only if it is not divisible by any integer k that $2 \leq k < N$. Write a program "Prime.java" that takes an integer N as input, and outputs all the primes smaller than or equal to N. In the output, two integers should be separated by one space.

For all test cases, $2 \leq N \leq 500$.

An example of console input	Expected console output
18	2 3 5 7 11 13 17