**Java program:** Prob08.java

**Input File:** Prob08.in.txt

**Output:** Your output needs to be directed to stdout (i.e., using System.out.println())

**Introduction**

In mathematics, a combination refers to a way of selecting some members of a group of things without regard to order. For example, if there were four pieces of fruit on a table: an Apple, an Orange, a Pear, and a Banana, there would be 6 ways to choose 2 fruits: Apple-Orange, Apple-Pear, Apple-Banana, Orange-Pear, Orange-Banana, and Pear-Banana.

In a similar fashion, a fighter pilot can only choose to engage a certain number of enemy targets based on how many weapons their plane has. Your job is to write a program that will compute the number of possible combinations of targets that can be engaged given the total number of enemy combatants and the number of missiles on a plane. The mathematical formula for computing a combination is given by:

Where n is the number of things to choose from (in this case, the number of targets), and k is the number of things to choose (in this case, the number of missiles). The exclamation point denotes a factorial. In case you are unfamiliar with them, a factorial is the product of a positive integer multiplied by all lesser positive integers. For example:

**Program Input**

The file Prob08.in.txt will contain two numbers per line separated by a space. The first number is the number of enemy combatants, and the second number is the number of missiles available. Both numbers will always be integers greater than zero, and the number of combatants will always be greater than the number of missiles.

**Example Input:**

2 1

50 10

**Program Output**

Your program should output the number of possible combinations of targets to engage, one per line.

**Example Output:**

2

10272278170

**Java program:** Prob09.java

**Input File:** Prob09.in.txt

**Output:** Your output needs to be directed to stdout (i.e., using System.out.println())

**Introduction**

In the classroom, the three R’s are Reading, wRiting, and aRithmetic. In real estate, the three L’s are Location, Location, and Location. Today we are going to learn about the three M’s of statistics. They are the Mean, Median, and Mode. Your job is to write a program to calculate these three values for a given data set.

The Mean of a set of data is simply the average. The Median is the value that is exactly in the middle, if the data set were sorted. In the event that there is an even number of values, the Median is the Mean of the two numbers in the middle of the data set. The Mode is the number (or numbers) that occur the most often in the data set.

**Program Input**

The file Prob09.in.txtwill contain sets of integers separated by commas. Each set will be on its own line.

**Example Input:**

1,5,3,4,2,5

2,1,3,1,2

**Program Output**

Your program should print the set number along with the values of the mean, median, and mode that you calculated for each set. If your answers are not integers, print only one decimal place. If there is more than one mode, sort them low to high and separate the numbers by commas.

**Example Output:**

Set 1: Mean=3.3, Median=3.5, Mode=5

Set 2: Mean=1.8, Median=2, Mode=1,2

**Java program:** Prob10.java

**Input File:** Prob10.in.txt

**Output:** Your output needs to be directed to stdout (i.e., using System.out.println())

**Introduction**

An Internet Protocol address (IP address) is a numerical label assigned to each device (e.g., computer, printer) participating in a computer network that uses the Internet Protocol for communication.

IP addresses consist of 4 decimal numbers ranging from 0 to 255 separated by periods (this is called dotted decimal notation). Each number is often referred to as an octet because numbers from 0 to 255 can be represented by 8 binary digits (see the binary number system appendix if you need more information on binary numbers).

IP addresses are broken down into 5 classes using the following rules:

* Class A network addresses range from 0.0.0.0 to 127. 255. 255. 255
* Class B network addresses range from 128.0.0.0 to 191. 255. 255. 255
* Class C network addresses range from 192.0.0.0 to 223. 255. 255. 255
* Class D network addresses range from 224.0.0.0 to 239. 255. 255. 255
* Class E network addresses range from 240.0.0.0 to 255. 255. 255. 255

Your task is to create a program that will classify IP addresses and convert them from 32 bit binary notation to dotted decimal notation.

**Program Input**

The file Prob10.in.txt will contain a series of 32 bit binary numbers, one per line.

**Example Input:**

01111111000000000000000000000001

11011010110111101010101101010101

10011010110111101010101101010101

10111010110111101010101101010101

11100000111111111111111111111111

11111111111111111111111111111111

**Program Output**

Your program must print the IP address in dotted decimal notation followed by a space and the classification of the IP address in the form [CLASS X].

**Example Output:**

127.0.0.1 [CLASS A]

218.222.171.85 [CLASS C]

154.222.171.85 [CLASS B]

186.222.171.85 [CLASS B]

224.255.255.255 [CLASS D]

255.255.255.255 [CLASS E]