Problem Set

ACM-ICPC Online Programming Competition 2016

Q1) Write a program that takes a composite number 'n' as input from the user and print all prime numbers from 1 to n in ascending order (if $n < 3$ then it is invalid input). Your program should output 0 in case of an invalid input.

Input: A composite number n

Output: All positive prime numbers smaller than n should be printed in ascending order. In case of an invalid input, your program should print 0.

Sample Input: 12
Sample Output: 2, 3, 5, 7, 11

Q2) Write a program to generate the next elements of the following series:

2, 4, 6, 4, …

Where the 4^{th} number is generated by adding first three numbers and then dividing by 3. Similarly, the n^{th} number is generated by adding (n-3)(n-2)(n-1) numbers and then dividing by 3.
You are given as input the count of (*the total*) numbers you need to generate.

Input: A number n, representing the number of elements to be generated.

Output: First n elements of the series where every element should be output before its successor (i.e. the next element). Every element should be printed on a new line. Your output should be precise up to 2 decimal places

Sample Input: 6
Sample Output:
2
4
6
4
4.67
4.89

Sample Input: 9
Sample Output:
2
4
6
4
4.67

4.89
4.52
4.69
4.70

Q3) Write a program that takes two values (call first value m and second n) from user and computes m^n.

Input: two numbers m and n
Output: value of m^n

Sample Input: 2, 5
Sample Output: 32

Sample Input: 5, 2
Sample Output: 25

Q4) Write a program which should find the Greater Common Divisor (GCD) between two numbers.

Input: two numbers m and n
Output: The largest/greatest number that divides both m and n

Sample Input: 20, 50
Sample Output: 10

Q5) Write a program which should find the Least common multiple (LCM) between two numbers.

Input: two numbers m and n
Output: The smallest number that is divisible by both m and n

Sample Input: 4, 14
Sample Output: 28

Sample Input: 15, 32
Sample Output: 480

Q6) Take a number from user and check whether it is Armstrong number or not? Armstrong number is taken by taking cube of its each digit. If answer is equal to the number then it is Armstrong number.
For example if we take 371 as input then as $3^3 + 7^3 + 1^3 = 371$, the output should be 'Y'; however, as 12 is not equal to $1^3+2^3=9$, therefore the output should be 'N'.

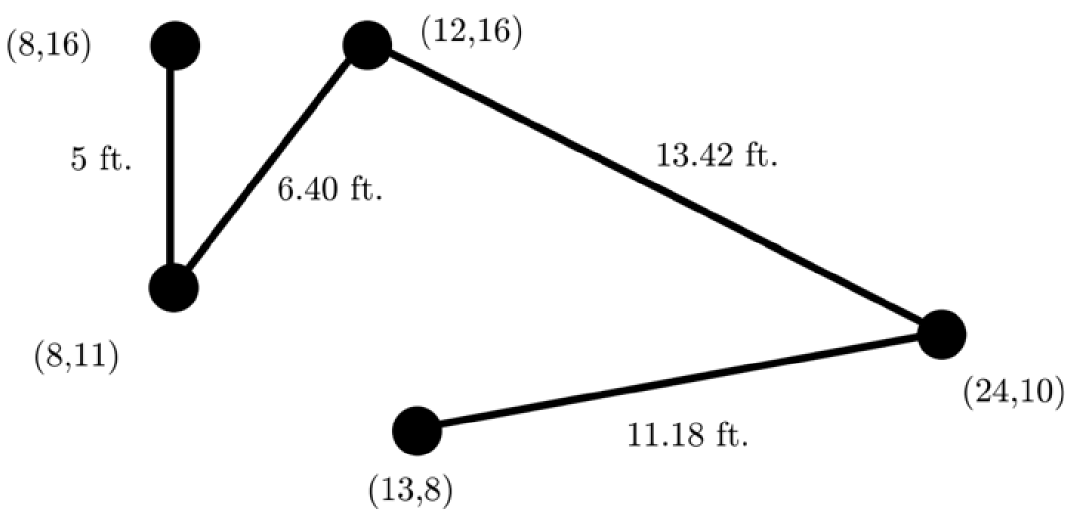
Input= A number n
Output= Y if n is an Armstrong number, N otherwise.

Sample:
Input=371
Output= Y

Input=12
Output=N

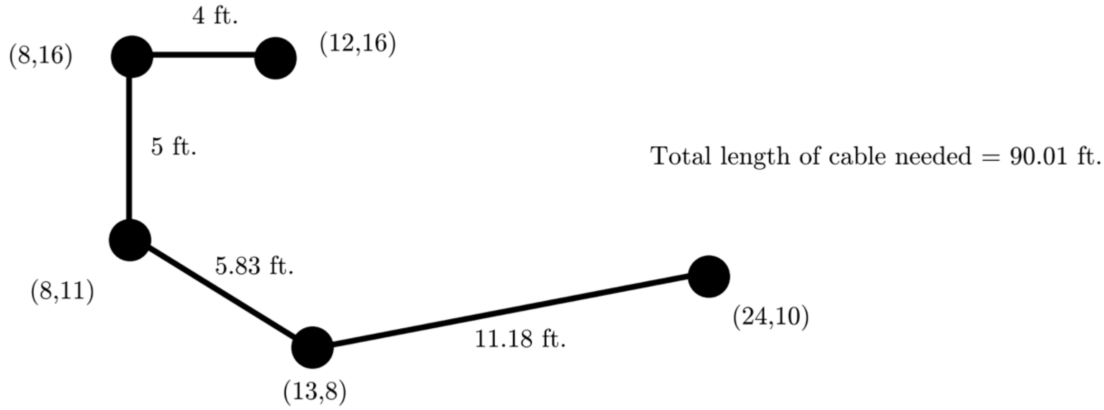
Q7)

Getting in Line Computer networking requires that the computers in the network be linked. This problem considers a “linear” network in which the computers are chained together so that each is connected to exactly two others except for the two computers on the ends of the chain which are connected to only one other computer. A picture is shown below. Here the computers are the black dots and their locations in the network are identified by planar coordinates (relative to a coordinate system not shown in the picture). Distances between linked computers in the network are shown in feet.



For various reasons it is desirable to minimize the length of cable used. Your problem is to determine how the computers should be connected into such a chain to minimize the total amount of cable needed. In the installation being constructed, the cabling will run beneath the floor, so the amount of cable used to join 2 adjacent computers on the network will be equal to the distance between the computers plus 16 additional feet of cable to connect from the floor to the computers and provide some slack for ease of installation.

The picture below shows the optimal way of connecting the computers shown above, and the total length of cable required for this configuration is (4+16)+ (5+16) + (5.83+16) + (11.18+16) = 90.01 feet.



Input:

The input file will consist of a series of data sets. Each data set will begin with a line consisting of a single number indicating the number of computers in a network. Each network has at least 2 and at most 8 computers. A value of 0 for the number of computers indicates the end of input. After the initial line in a data set specifying the number of computers in a network, each additional line in the data set will give the coordinates of a computer in the network. These coordinates will be integers in the range 0 to 150. No two computers are at identical locations and each computer will be listed once.

Output:

The output for each network should include a line which tells the number of the network (as determined by its position in the input data), and one line for each length of cable to be cut to connect each adjacent pair of computers in the network. The final line should be a sentence indicating the total amount of cable used.

In listing the lengths of cable to be cut, traverse the network from one end to the other. (It makes no difference at which end you start.) Use a format similar to the one shown in the sample output, with a line of asterisks separating output for different networks and with distances in feet printed to 2 decimal places.

Sample Input:
3
132 73
49 86
72 111
0

Sample Output
****
Network #1
Cable requirement to connect (132,73) to (72,111) is 87.02 feet.
Cable requirement to connect (72,111) to (49,86) is 49.97 feet.
Number of feet of cable required is 136.99