PROBLEM SET – A

# Problem 1: Find Average Value

You will be given N numbers. You have to print the average value of them.

|  |  |
| --- | --- |
| Input | Output |
| 12  5 2.0 2 6.2 77 11.1 5 1212 2 11 3 0  15  1 4 7 7 4 5 5 1 21 2 12 5221 21 521 21 | Case 1: 111.358333  Case 2: 390.200000 |

# Problem 2: Sum 1

You have to take two numbers from console by using scanf() function. And print the summation of those number. Below some input and output is given. Your program have to match every input-output.

|  |  |
| --- | --- |
| Input | Output |
| 2 4 | 6 |
| 7 8 | 15 |
| 0 13 | 13 |
| -3 66 | 63 |
| 12 -12 | 0 |

Hints: Use a while loop to take input consecutively.   
 e.g.: while(scanf(“%d %d”, &a, &b) ==2){ }

# Problem 3: Sum 2

You will be given a number **N**, denoting N integers to follow. Print the sum of these integers in a line.

|  |  |
| --- | --- |
| Input | Output |
| 8  3 1 3 5 -3 7 0 1 | 17 |

# Problem 4: Cumulative Sums

Now it is a bit interesting problem. You have to print cumulative sums of a given integers. If you don’t know what cumulative sum means, search the web for a bit.

You will be given **N** and in the next line, there will be **N** numbers. You have to print cumulative sums from 1st to nth number.

|  |  |
| --- | --- |
| Input | Output |
| 12  0 8 7 6 1 2 4 -3 -1 11 0 5 | 0 8 15 21 22 24 28 25 24 35 35 40 |

Hint: You can use an Array to store the numbers. However, It can also be done without an array.

# Problem 5: Hello World

We all say “Hello world” in our first program. I know the next problem won’t be your first one. So, rather just saying hello to the world, you will say hello to a specific person.

You will be given a number **T**, denoting T lines of test cases will follow. In each case, you will be given a string.

For each test case, there will be one line of output. First print the case number like this: “Case #: “, here replace # with case number. Then print “Hello $”, replace $ with given string.

See sample input-output below to understand clearly.

|  |  |
| --- | --- |
| Input | Output |
| 4  Abi  Nike  Abir  Fail | Case 1: Hello Abi  Case 2: Hello Nike  Case 3: Hello Abir  Case 4: Hello Fail |

# Problem 6: Rectangular room

Miu lives in a cube world, so she doesn’t know how to calculate the area of a rectangular room. She knows there are three distinct sides of a rectangular shaped room. She wants to find the summation of them. Will you help her?

1st area

2nd area

3rd area

You will be given **T**, denoting T test cases will follow. In each test case, **L W H** denoting Length, Width, and Height will be given.

For each test case print the case number first and then print the sum of three distinct area of the rectangle.

|  |  |
| --- | --- |
| Input | Output |
| 5  2 5 8  1 6 8  1 1 1  237822 2777 222  1232 28836 3327 | Case 1: 66  Case 2: 62  Case 3: 3  Case 4: 713844672  Case 5: 135562188 |

# Problem 7: Fibonacci number

You will be given **N**. Now print Fibonacci numbers from 1st to Nth. If you don’t know what Fibonacci number is, observe the output carefully. You can find a sequence there. Otherwise search the internet.

|  |  |
| --- | --- |
| Input | Output |
| 15 | 1  1  2  3  5  8  13  21  34  55  89  144  233  377  610 |

# Problem 8: Divisors

Was the problem with primes very hard? Now there is an easy problem. Given an integer N, you have to print all divisors of that number. Input will be terminated by 0.

|  |  |
| --- | --- |
| Input | Output |
| 12  24  1024  119  121  11  0 | Divisors of 12: 1, 2, 3, 4, 6, 12  Divisors of 24: 1, 2, 3, 4, 6, 8, 12, 24  Divisors of 1024: 1, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024  Divisors of 119: 1, 7, 17, 119  Divisors of 121: 1, 11, 121  Divisors of 11: 1, 11 |

# Problem 9: Prime number

Do you know what a prime number is? If you don’t, then know it anyhow. Otherwise you won’t be able to proceed further.

You will be given **T** denoting T test case to follow. In each test case, an integer below will be given. You have to say if it is a prime or not.

Print the case number first, then if the given integer is prime, say “Yes”, otherwise say “No”.

|  |  |
| --- | --- |
| Input | Output |
| 8  1  2  3  19  39  119  122348881  2147483647 | Case 1: No  Case 2: Yes  Case 3: Yes  Case 4: Yes  Case 5: No  Case 6: No  Case 7: No  Case 8: Yes |

# Problem 10: Line Intersection

You have already learned how to calculate the cross points between two lines. Can you do it now?

A line is defined by the following equation:

Suppose two lines are given like this:

Now you have to find common point for both of the lines.

You will be given **T**, denoting the number of test case.

For each test case, the value of and will be given.

Print case number first and then denoting their intersection point.

|  |  |
| --- | --- |
| Input | Output |
| 3  3 1 5  1 2 3  2 -2 5  4 6 -2  1 0 3  0 1 5 | Case 1: x = 1.400, y = 0.800  Case 2: x = 1.300, y = 1.200  Case 3: x = 3.000, y = 5.000 |

# Problem 11: How many characters?

You will be given **T** denoting the number of test cases. Each case contains a string in a single line. You have to say how many characters it has in it. Each line doesn’t exceed 100 in length.

|  |  |
| --- | --- |
| Input | Output |
| 6  Shahjalal University of Science and Technology  This is a string.  Spaces and dots(.) are also characters  Use " %[^\n]" to read all characters in a line  You can also use gets() function  Take array size 10 to 20 larger than given limit | Case 1: 46  Case 2: 17  Case 3: 38  Case 4: 46  Case 5: 32  Case 6: 48 |

Hints: You can use a very useful library function from <string.h> header file.

# Problem 12: Palindrome check

Do you know what a palindrome is? You can search the net for a bit. Palindrome is a sequence of characters which is the same no matter what direction you read from. E.g.: “1001”, “madam” etc. are palindromes.

You will be given **T**, the number of test cases. Each case contains a string containing alphabetic characters only.

Print “Yes” if given string is palindrome, otherwise print “No”

|  |  |
| --- | --- |
| Input | Output |
| 7  madam  Madam  reer  ringing  PoP  pOop  AdsdA | Case 1: Yes  Case 2: No  Case 3: Yes  Case 4: No  Case 5: Yes  Case 6: No  Case 7: Yes |

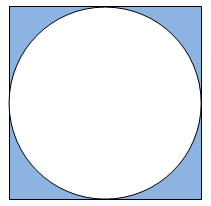
# Problem 13: Search String

You will be given a sentence and then **N** words. You have to say whether the given word contains in the sentence.

|  |  |
| --- | --- |
| Input | Output |
| This is a sen-tence. Now say, whether a word is in it.  8  Hi  now  is  ow  his  ether  as  sen-ten | Case 1: no  Case 2: no  Case 3: yes  Case 4: yes  Case 5: yes  Case 6: yes  Case 7: no  Case 8: yes |

# Problem 14: Circle in Square

A circle is placed perfectly into a square. The term perfectly placed means that each side of the square is touched by the circle, but the circle doesn't have any overlapping part with the square. See the picture below.



Now you are given the radius of the circle. You have to find the area of the shaded region (blue part). Assume that **pi = 2 \* acos (0.0) (acos** means cos inverse**)**.

# Input

Input starts with an integer **T (≤ 1000)**, denoting the number of test cases.

Each case contains a floating point number **r (0 < r ≤ 1000)** denoting the radius of the circle. And you can assume that **r** contains at most four digits after the decimal point.

# Output

For each case, print the case number and the shaded area rounded to two places after the decimal point.

|  |  |
| --- | --- |
| Sample Input | Output for Sample Input |
| 3  20  30.091  87.0921 | Case 1: 343.36  Case 2: 777.26  Case 3: 6511.05 |

# Problem 15: Power

I have power, you have power, and every numbers also have their powers. Wouldn’t it be great to be able to calculate the power of a number?

You will be given two integers **N** and **P** in a line. **0 0** denotes the end of input.

Print the result ofin a line. The result can be very big. So mod it by 100007.

|  |  |
| --- | --- |
| INPUT | OUTPUT |
| 1 1 | 1 |
| 10 2 | 100 |
| 2 10 | 1024 |
| 2 20 | 48506 |
| 343 232 | 89412 |
| 512 512 | 3105 |
| 0 0 |  |

Hint: (a \* b) mod m = ((a mod m) \* (b mod m)) mod m

Problem SET A

Problem 1-14: Sudipto Chandra (Dipu)

Problem 14: LightOJ 1116

**Set B**

Problem 1: Maximum number

You are given an array of integers. Find the maximum value among them.

First line of the input is n which the number of integers to follow is. The following line consists of n integers.

|  |  |
| --- | --- |
| Sample Input | Output for sample input |
| 5  1 2 3 4 5  3  10 20 30 | 5  30 |

Problem 2: Minimum number

You are given an array of integers. Find the minimum value among them.

First line of the input is n which the number of integers to follow is. The following line consists of n integers.

|  |  |
| --- | --- |
| Sample Input | Output for sample input |
| 5  1 2 3 4 5  3  10 20 30 | 1  10 |

Problem 3: Array Query

You are given an array of integers. Find the maximum difference between any two value of indices.

First line of the input is N which denotes the number of integers to follow. Second line has those integers.

|  |  |
| --- | --- |
| Sample Input | Output form sample input |
| 5  1 2 3 4 5  4  7 8 9 10 | 4  3 |

Problem 4: Binary Conversion

You are given a decimal number N(N is always non negative). Write a program that takes N and prints it in its ( N’s) binary form.

|  |  |
| --- | --- |
| Sample Input | Output for sample input |
| 345  0  287 | 101011001  0  10011111 |

Problem 5: Decimal Conversion

You are given a binary number N(N is always non negative). Print it in decimal.

|  |  |
| --- | --- |
| Sample input | Output for sample input |
| 101011001  0  100011111 | 345  0  287 |

Problem 6: Factorials.

You are to write a program that prints factorial of given input N(N≤12).

|  |  |
| --- | --- |
| Sample input | Output for sample input |
| 5 | 120 |

Problem 7: Fibonacci numbers.

Write a program that takes N and prints Nth Fibonacci number. (N <40)

Note:  
Fibonacci(n) = Fibonacci(n-1) + Fibonacci(n-2) *for* n≥2

Fibonacci(0) = 0, Fibonacci(1) = 1;

|  |  |
| --- | --- |
| Sample input | Output for sample input |
| 5  10 | 5  55 |

Problem 8: Consecutive sum

You are given two integers a and b (1<=a,b<=10000). Write a program that prints the sum of integers lying in between them.

|  |  |
| --- | --- |
| Sample input | Output for sample input |
| 10 20  40 30 | 165  385 |

Problem 9: Solution to quadratic equation

Consider the following equation.

Ax2 + Bx + C = 0.

Find the solutions of x.

First line of the input contains three real numbers A, B, C respectively. Output a line which contains solutions to x. You are guaranteed that you will never have imaginary solutions.

|  |  |
| --- | --- |
| Sample input | Output for sample input |
| 5 6 1 | -0.200000 -1 |

Problem 10: Primes

A prime number is an integer which has exactly two divisors. :)

First few prime numbers are: 2, 3, 5, 7, 11, 13…..

You are to write a program that prints 1500th prime number. There is no input for this program. Output a line with the desired solution.

Problem 11: Floor function and Ceiling function

You are given a real number. Print its floor and ceil value respectively.

(You are not allowed to use library floor or ceil function)

|  |  |
| --- | --- |
| Sample input | Sample output for input |
| 1.5  2 | 1 2  2 2 |

Problem 12: Round function

You are given a real number N. Round it to nearest integer.

(You are not allowed to use built in round function)

|  |  |
| --- | --- |
| Sample input | Sample output for input |
| 1.5  2.1 | 2  2 |

Problem 13: String Count

You are given a string consisting of only alpha-numerals. You are to count the percentage of vowels, consonants and digits in the string. Please note that English has five vowels.

Input consists of a single line with the string. See the sample output for the exact output format.

|  |  |
| --- | --- |
| Sample input | Output for sample input |
| Abcd2 | Vowels = 20.00 %  Consonants = 60.00%  Digits = 20.00% |

Problem 14: String reverse

You are given a string. You must write a program that reverses the string. You may assume that the length of string won’t exceed 1000. You should only consider the English letters.

First line of the input consists of the string itself.

|  |  |
| --- | --- |
| Sample input | Output for sample input |
| You are a div 1 programmer. | remmargorp1vidaerauoY |

Problem 15: Grid Rotation

You are given a 2D character grid. Write a program that rotates the grid once in clockwise direction.

First line of the input contains R<=50, C<=50 which denote row and column of the grid respectively.

See the sample output for the exact format.

|  |  |
| --- | --- |
| Sample input | Sample output for input |
| 3 3  abc  def  ghi | Gda  heb  ifc |