



# **Luxor University**

## **Faculty of computers and information**

### **Programming Fundamentals**

#### **Lab Sheet #1**

**Objectives:**

- Learn how to think on paper before coding.
- Learn how to construct your program step by step in detail (Algorithm).
- Learn how to present your program algorithm in an efficient and organized way.
- Learn how to trace and optimize you program instructions.

**Problems:**

- Sum of 3 numbers
- Area of circle
- Swap
- Is Multiple?
- Max of 3 numbers
- Point coordinates
- Digit, char(Case)
- Roots
- $\sum_{i=0}^{i=n} i$
- Max of n numbers
- Super Mario

# Sum of 3 numbers

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## Problem statement:

Instead of using our simple calculator, make a program that take 3 numbers from user and output their sum.

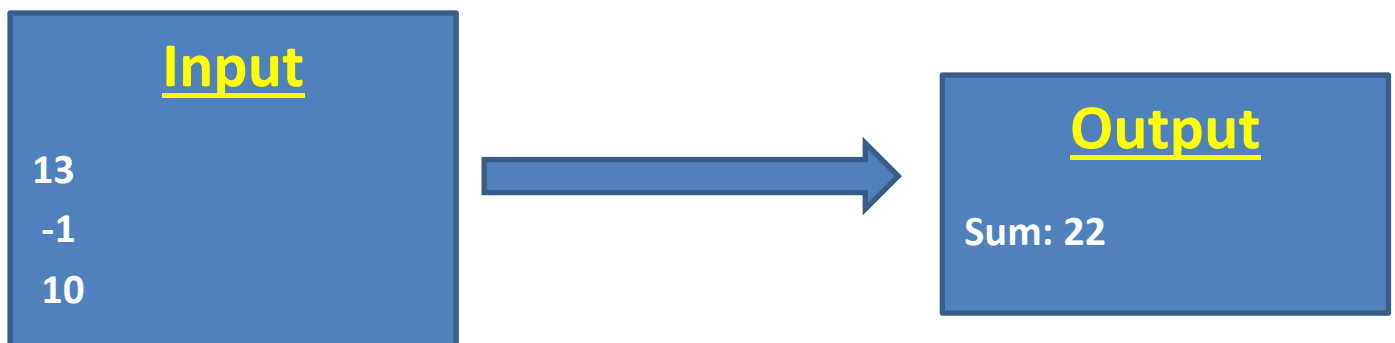
## Input:

3 numbers: x, y, z.

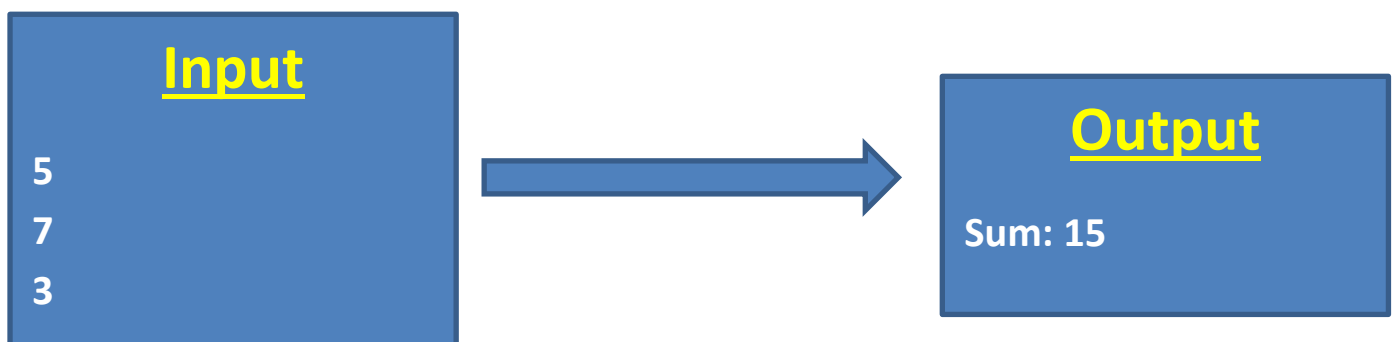
## Output:

Sum of (x, y and z).

## Example 1:



## Example 2:



# Area of circle

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## Problem statement:

Make a program that take the radius of the circle from user (r) and output the area of circle.

## Notes:

Area of circle =  $\pi r^2$

## Input:

Circle radius (r).

## Output:

Circle area.

## Example 1:



# Swap

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## **Problem statement:**

In your program make 2 variables (x, y), initialize x with 3 and y with 5 then swap their values.

## **Challenge:**

Don't use third variable in swapping.

# Is Multiple?

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## Problem statement:

Your program will take 2 numbers (x, y). Check if (y) is a multiple of (x) or not. If it is multiple outputs the result of division otherwise output "Not Multiple".

## Notes:

(y) is multiple of (x) when we product (x) to a specific value (z) and equals (y)  
( $x * z = y$ ) and if it is output (z)

## Input:

2 numbers: x, y.

## Output:

If (y) multiple of (x) output (y/x) otherwise output "Not Multiple"

## Example 1:



## Example 2:



## Example 3:



# Max of 3 numbers

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## Problem statement:

Make a program that takes 3 numbers and output the maximum number.

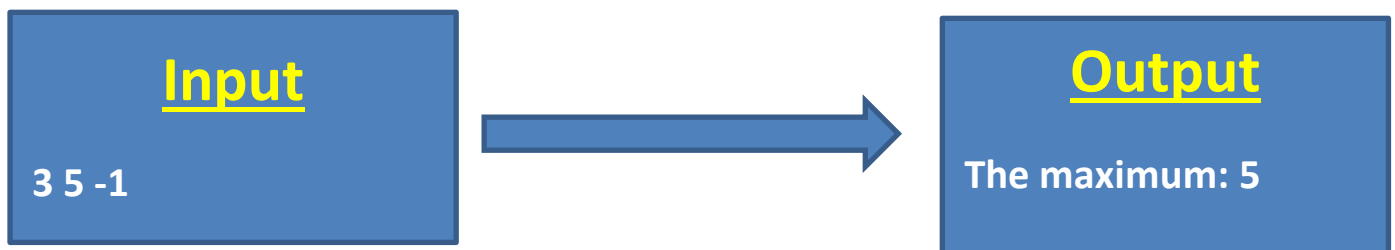
## Input:

3 numbers: x, y, z.

## Output:

The maximum number.

## Example 1:



## Example 2:



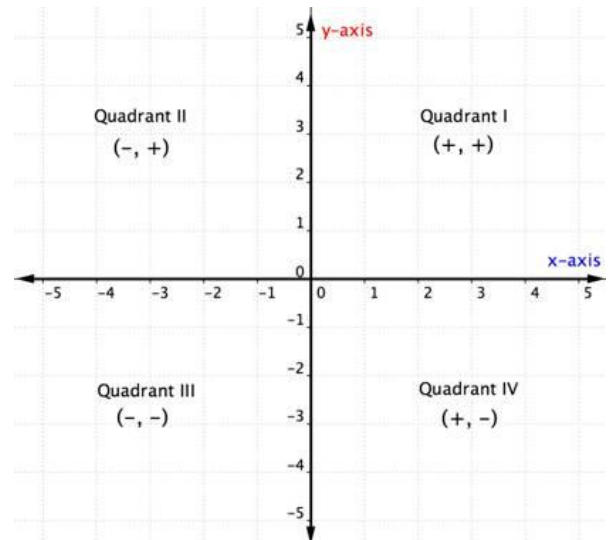
# Point coordinates

## Problem statement:

Given two numbers  $X$ ,  $Y$  which donate coordinates of a point in 2D plan. Determine in which quarter it belongs.

## Notes:

- Output **Q1, Q2, Q3, Q4** according to the quarter in which the point belongs to.
- Output **"Origen"** If the point is at the origin.
- Output **"X-axis"** If the point is over X axis.
- Output **"Y-axis"** if the point is over Y axis.



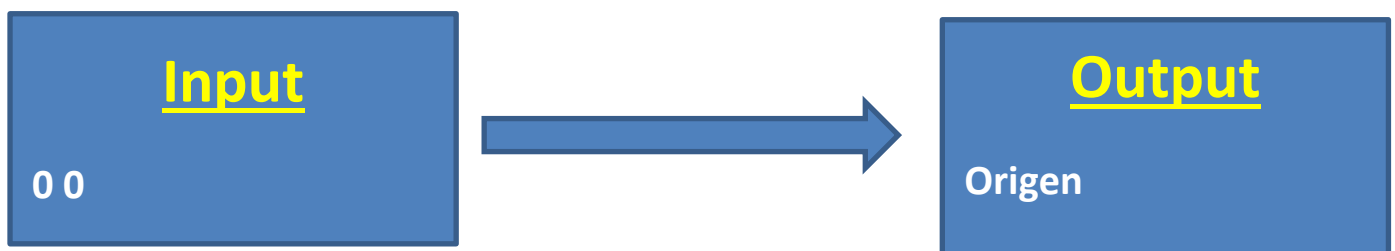
## Input:

2 numbers:  $x$ ,  $y$ .

## Output:

in which quarter the point belongs.

## Example 1:



## Example 2:





# Digit, char (Case)

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## Problem statement:

Your program has to take an input from user determine the input state:

- If the input is a number or digit output **"Digit"**
- If the input is a character output **"Char"** then check his case:
  - If the character is capital output **"Capital"**
  - If the character is small output **"Small"**

## Example 1:



## Example 2:



# Roots

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## Problem statement:

You have a quadratic equation like this ( $ax^2 + bx + c = 0$ ). You will be given values of (a, b, c) to make a program that solves the equation using **The Quadratic Formula**. If the equation is solvable with real value using the formula output **“Solvable”** otherwise output **“Not solvable”**

## Notes:

$$\text{Quadratic Formula} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

## Input:

Values of (a ,b ,c).

## Output:

If the equation is solvable with real value using the formula output **“Solvable”** otherwise output **“Not solvable”**

## Example 1:



## Example 2:



$$\sum_{i=0}^{i=n} i$$

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**Problem statement:**

Your program will take a number (n) from the user and has to output the summation of numbers from 1 to (n)

**Input:**

1 number: (n).

**Output:**

The summation of numbers from 1 to (n)

**Example 1:****Explanation:**

$$1+2+3 = 6$$

**Example 2:**

# Max of n numbers

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## Problem statement:

This problem is similar to the previous problem (Max of 3 numbers). But instead of 3 numbers, output the maximum number of (n) numbers, while (n) will be given by the user.

## Input:

A number (n) refers to the number of numbers. Then (n) numbers.

## Output:

The maximum number of (n) numbers

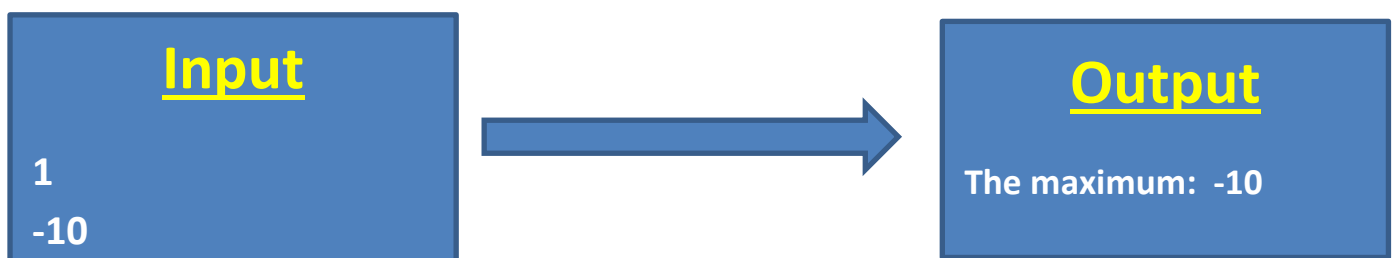
### Example 1:



### Example 2:



### Example 1:



# Super Mario

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## Problem statement:

Do you know Super Mario game?

We changed the game rules, Mario instead of avoiding the monsters by jumping he will fight them all. But because he is very weak always he loses the fight and loses his health. At the beginning of the game Mario starts with health **100**, then he fights (n) monsters.



Each monster (i) has a power ( $x_i$ ) and when Mario fights it, he lose and his health will be decreased by ( $x_i$ ). While Mario health is a positive value he still alive otherwise he dead. You will be given the number of monsters (n) and the power of each monster ( $x_i$ ) can you tell us if Mario will be alive or be dead after fighting all monsters.

## Notes:

Positive value means (value > 0)

## Input:

A number (n) refers to the number of monsters. Then (n) numbers  
Each number ( $x_i$ ) refers to monster's power.

## Output:

If Mario still alive after fighting all monsters output **"Alive"** otherwise output **"Game over"**

## Example 1:

