Problem Solving

Input → Processing → output

(Data) **(Information)**

Data Type

Data type is the kind of data that can be stored in a variable. There is a number of traditional datatypes found in programming languages such as:

1. **Integers**

   Integers are numeric data items. The integer is the whole number without fractional part. An integer number can be either positive, negative or zero.

   Examples:

   7 , 220 , -18, 0 , 350 .. etc

2. **Real Numbers**

   Real numbers are the numbers with the fractional part.

   Examples: 3.5 ,6.0, -8.0 ,0.0 , 1.3

3. **String**

   Sequence of characters, characters can be:

   1. Digits : 0…9
   2. Letters: A..Z,a…z
   3. Special Symbols: @, . ; : ? …etc

   If the string consists of one character it must be enclosed between single quote, if it has more than one character it must be enclosed between double quotes.

   Examples: "rasha " , "Patient" , "data1" , “120@lab” , ‘A’ , ‘@’ , ‘1’ …etc

4. **Booleans**

   Are data items used as status indicators and it can be either TRUE or FALSE.

Variables and Constants

A **variable** is a named memory location which temporarily stores data that can change at any point while the program is running.

A **constant** is a named memory location which temporarily stores data that remains the same throughout the execution of the program.

Assignment Statement

The right side in the assignment statement is stored in the left side.

Both left side and right side must have the same data type.

Left side		Right Side
Variable	=	- Value (A=3,B=3.5,C="dana " , y=true) - Another variable (A=B) - Expression (a=b+5)

Invalid Assignment Statements: (5=y, L+5=m)

Arithmetic Operators:

+	Addition	3+2= 5, -3+2=-1, -2+3= 1
-	Subtraction	3-2=1,2-3=-1,-2-3=-5
*	Multiplication	2*3=6,-2*3=-6,2*-3=-6,-2*-3=6
/	Division	3/2=1.5,-3/2=-1.5,3/-2=-1.5,-3/-2=1.5
^	Power	2^3=8 ,2^-1=0.5 , -2^2=4
mod	Modulus	5 mod 2= 1 , 6 mod 3= 0 ,4 mod 6= 4 ..etc

Relational operators:

>	Greater than	3>2 = true , 4>10 = false
<	Less than	6<10= true , -8<-10 = false
>=	Greater than or equal	5>=5 = true
<=	Less than or equal	-4<=4 = true ,
=	Equal	5=6 = false , -3=-3 = True
<>	Doesn't equal	2<>4= true , 2<>2= false

Logical Operators:

NOT	NOT T = F NOT F= T
AND	T AND T= T T AND F= F F AND T = F F AND F = F
OR	T OR T= T T OR F= T F OR T= T F OR F = F

Operators Precedence(from Highest to Lowest):

( )

^

*, /

mod

+,-

>,<,>=,<=,=,<>

NOT

AND

OR

Evaluate the following expressions:

- X=3.6+ 9 mod (6*(3+2))/2+2^(3-2)*2 Answer : 16.6

- Y= 6*3-(4+2)*2+10 mod 3^1^2-8 Answer : -1

- Z=(2+1)^((4+8)/4)+1 Answer: 28

- X= 2+3> 1 and 5<> 9/3 or 5+4=8 Answer: True

- Y= 3>= 9 or (5+1) <> 2 and NOT ((7-3)<2 or NOT F) Answer: false