PROGRAMMING LOGIC AND TECHNIQUES

Algebra and Functions

Expressions

- An **expression** is a combination of symbols (variables, operators & constants) that can be evaluated when the variables are assigned to some values

Expressions

- In math, an expression evaluates to a numerical value but the values of the variables are not fixed, so we cannot "solve" for a variable
- Example:

  $4x + 3 - 10y$

  evaluates to 111 when $x=2$ and $y=-10$

Equations

An equation is a pair of expressions separated by an equal sign

In an equation with one variable, the value of that variable is fixed. Therefore, we can isolate the variable to find its value

Equations

Example:

$$3x - 2 = 4$$

$$3x = 6$$

$$x = 2$$

Functions

A **function** is a relation that takes a set of inputs and produces a unique output for each input

Ex: $f(x) = 2x^2 + 4x - 3$

$g(x) = 3x - 1$

$f(x)*g(x)=(2x^2+4x-3)*(3x-1) = 6x^3+10x^2-13x+3$

$p(x,y) = -6x + 10y^3$

Functions

We can **evaluate** a function by replacing the variables by acceptable values* for that function

*Not all functions can take all possible real numbers as input. For instance, a function cannot take as input a number that will induce a division by zero

Exercises

- Write the function that finds the average of two numbers x and y

- Write a function that takes as input two numbers and outputs the sum of the first number and double the second number

Exercises

- Write a function that takes as input a tax rate and a price and returns the final price of the item after tax
- Write a function that takes as input the number of people working on a job, the amount of time that it takes those people to complete the job, the number of desired people for the job, then outputs the number of hours that the job will take with the second number of people.

Exercises

- Write a function that takes as input x and y, and outputs the product of: the sum of the double of x with y and the sum of x and the double of y

- Write a function that takes as input another function g(x,y,z) and replaces each instance of x with 2