Programming and Problem Solving through C Language
O Level / A Level

Chapter -2 : Algorithms for Problem Solving

Algorithm can be defined as: "A sequence of activities to be processed for getting desired output from a given input."

Before writing an algorithm for a problem, one should find out what is/are the inputs to the algorithm and what is/are expected output after running the algorithm.

While writing algorithms we will use following symbol for different operations:
'+' for Addition
'-' for Subtraction
'*' for Multiplication
'/' for Division and
'= ' for assignment. For example A= X*3 means A will have a value of X*3.

Example of Algorithm

Problem 1: Find the area of a Circle of radius r.

Inputs to the algorithm:
Radius r of the Circle.
Expected output:
Area of the Circle

Algorithm:

Step1: Read\input the Radius r of the Circle
Step2: Area= PI*r*r // calculation of area
Step3: Print Area

Problem 2: Write an algorithm to read two numbers and find their sum.

Inputs to the algorithm: First num1. Second num2.

Expected output: Sum of the two numbers.

Algorithm:

Step1: Start

Step2: Read\input the first num1.

Step3: Read\input the second num2.

Step4: Sum= num1+num2 // calculation of sum

Step5: Print Sum

Step6: End

Problem 3: Convert temperature Fahrenheit to Celsius

Inputs to the algorithm:

Temperature in Fahrenheit

Expected output:

Temperature in Celsius

Algorithm:

Step1: Start

Step 2: Read Temperature in Fahrenheit F

Step 3: C 5/9*(F32)

Step 4: Print Temperature in Celsius: C

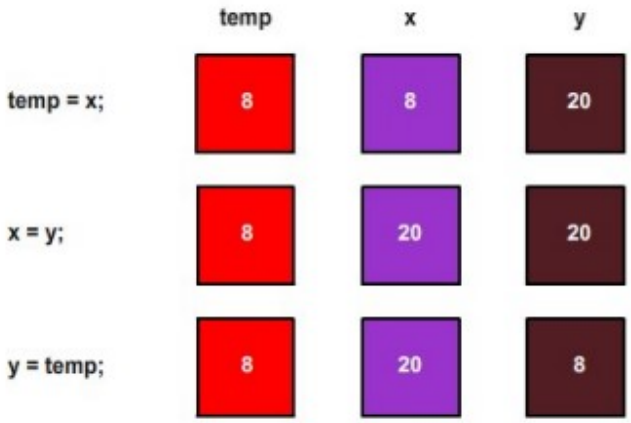
Step5: End

Problem 3 : Exchanging Values of Two Variables

- Problem definition: Exchanging values of two variables.
- Analysis: Two variables x and y contains two different values.
- Swap the values of x and y such that x has y's value and y has x's value.
- Solving by example: Let us consider two variables x and y,containing values 8 and 20 respectively.
- The original values of x and y are:

- The requirement is once the algorithm is performed, the results should be

- If you think by just saying,
  - x=y; y=x;
- The value gets swapped, then you are mistaken.
- These instruction are atomic in nature and hence x = y means that the value of 'x' is lost.
- So,we have to use a temporary variable,temp to store the value of 'x'.



- The value of 'x' and 'y' is swapped.

Algorithm Definition

Step 1: Start.

Step 2: Get the values of x and y.

Step 3: Store x's value to temp. (temp: =x)

Step 4: Store y's value to x. So, x has y's value now (x: =y)

Step 5: Store temp's value (the value of the old 'x') in y.

Step 6: Stop.