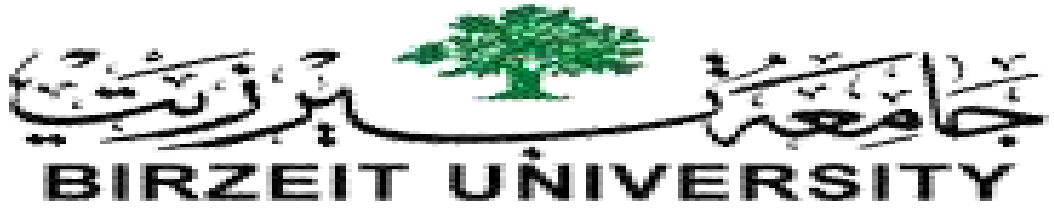

Algorithm

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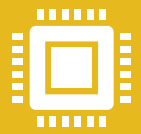
Comp 133

What is an algorithm?

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.

Common Action Keywords

- Input: READ , OBTAIN, GET
- Output: PRINT, DISPLAY, SHOW
- Compute: COMPUTE,CALCULATE
- Initialize: Set, let
- Add one: Increment, add one to..

Types of Algorithm operations

Sequential

Conditional

Iterative

- Sequence
  - The sequence is exemplified by sequence of statements place one after the other – the one above or before another gets executed first.
- Conditional (Selection)
  - The *branch* refers to a binary decision based on some condition. If the condition is true, one of the two branches is explored; if the condition is false, the other alternative is taken.
- Loop (Repetition)
  - The *loop* allows a statement or a sequence of statements to be repeatedly executed based on some loop condition. It is represented by the 'while' and 'for' constructs in most programming languages.

Example 1(sequence) : 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.
- Solution:

1. Start
2. Read\input the first num1.
3. Read\input the second num2.
4. Sum = num1+num2
5. Print Sum
6. End

Selection

- The structure of IF is as follows:

If condition then

true alternative

else

false alternative

endif

- The structure of switch case is as follows:

CASE expression OF

Condition 1: sequence 1

Condition 2: sequence 2

…..: ….

Condition n: sequence n

OTHERS:default sequance

END CASE

Example 2(Conditional): Write an algorithm to find the largest value of any three numbers.

```
Read A, B, C
If A>=B and A>=C then
        print A
Else if B>=A and B>=C then
        print B
Else
        print C
End if
```

Example 3(Conditional):**Write an algorithm to read a number x and display its sign.**

Ask user to enter a number
Read number and save as X
If x is greater than zero then
    print x “is positive”
 else if x is equal zero then
    print x “is zero”
 else
    print x “is negative”
 end if

Loop

- The structure of While is as follows:

WHILE condition

sequence

END WHILE

- The structure of For is as follows:

FOR iteration bounds

sequence

END FOR

Example 4(Loop): Write an algorithm to print numbers between 10 to 20

Set i equal to 10
While i is less than or equal to 20
    print i
    add one to i
end while

Example 5(Loop):

Write an algorithm that will count the number of student pass in a class and the amount failed. The pass mark is more than or equal to 60. Suppose the number of students are 20 The algorithm should output the amount fail and passed.

```
Set counter to zero
Set numberOfStudents to 20
Set passCounter to zero
Set failureCounter to zero
While counter less than numberOfStudents
        Ask user to enter student average
        Read average and save as ag
        if ag greater than or equal 60
        then
                increment passCounter
         Else
                increment failureCounter
        end if

        Increment counter

end while

Print "pass counter =" passCounter and failure counter =" failureCounter
```

HW Exercise:

Write an algorithm that takes 20 integers and decides and prints the number of integers divisible by 3 and the number of integers not divisible by 3.

Thank You.