



# Algorithm

Extra Exercises  
Comp230

# EXERCISE 1

- Write an algorithm to calculate the average of a set of students (we don't know their count).

When -1 is entered this means that algorithm should stop receiving data, and print the output.

# Soulution

Set sum to 0

Set count to 0

Ask user to enter grade

Read grade and save as gd

While gd is not equal to -1

    Add the gd to sum

    Increment count by 1

    Ask user to enter grade

    Read grade and save as gd

End while

If count is greater than 0 then

    set the average to the sum divided by count

    print "The average is: " average

End if

# EXERCISE 2

- Write an algorithm to print the number of passes and the number of failures in a class of  $n$  students ( $n$  is not defined by the user), also let the program print the failure percentage. When -1 is entered this means that algorithm should stop receiving data, and print the output.

# Solution

```
Set passCount to 0
Set failCount to 0
Set totalCount to 0
Repeat
Ask user to enter grade
Read grade and save as result
    If result is -1 then
        exit the loop
    End if
    Increment totalCount by 1
    If result is a pass then
        Increment passCount by 1
    Else
        Increment failCount by 1
    End if
Until -1 is entered
```

```
If totalCount is greater than 0:
    Set failurePercentage as (failCount / totalCount) * 100
    print "Number of passes: " passCount
    print "Number of failures: " failCount
    print "Failure percentage: " failurePercentage "%"
End if
```

# EXERCISE 3

- Write an algorithm to calculate and print the factorial of any number.  
For example: if the user enters the number 5, the algorithm should calculate the value of  $5! = 5*4*3*2*1$  and print the result which is 120.

# Solution

1. Ask user to enter number
2. Read number and save as num
3. Set factorial to 1.
4. If num less than 0 then  
    print "Factorial is undefined for negative numbers."  
else if num is equal 0 then  
    print "The factorial of 0 is 1."  
else
6. For i from 1 to num  
    Set factorial as Multiply factorial by i  
end for
7. Print "The factorial of number" num " is " factorial  
End if

# EXERCISE 4

- Write an algorithm to print the sum of the following series, taking the first 8 terms:  $A = 1! + 2! + 3! + 4! + 5! + 6! + 7! + 8!$



# Solution

Set sum to 0 (to store the sum of the series)

Set i to 1 (i is loop control variable)

For i from 1 to 8

    Set factorial to 1.

    Set j to 1 (j is loop control variable)

    For j from 1 to i

        Set factorial as Multiply factorial by j

    end for

    Add factorial to sum.

End for

print "The sum of the series A is " sum

# EXERCISE 5

- Write an Algorithm to do the function of a simple calculator which should be able to do +,-,\*,/,% operations.

For example : if the user insert  $5 + 9$  , the program should print 14

# Solution

Ask user to enter number

Read number and save as first\_operand

Ask user to enter operation

Read operation and save as operation

Ask user to enter number

Read number and save as second\_operand

Case operation of

'+' : result = first\_operand + second\_operand

'-' : result = first\_operand - second\_operand

'\*' : result = first\_operand \* second\_operand

'/' : result = first\_operand / second\_operand

'%' : result = first\_operand Mod second\_operand

ENDCase

Print the result

# EXERCISE 6

- Write an Algorithm to find the maximum element of a set of  $n$  integers. Ask the user to enter the value of  $n$ , then the elements of the set.

# Solution

Set counter to one

Ask user to enter number of Integers

Read number of Integers and save as number\_of\_Integers

Ask user to enter first integer value

Read first integer value and save as first\_integer\_value

maximum = first\_integer\_value

While counter is less than the number\_of\_Integers

Ask user to enter next integer value

Read next integer value and save as next\_integer\_value

IF maximum is less than next\_integer\_value THEN

    maximum = next\_integer\_value

ENDIF

Add one to counter

ENDWhile

Print “ The Maximum number is “maximum

# EXERCISE 7

- Write an Algorithm to find all the prime numbers in the range 100 to 200.

# Solution

