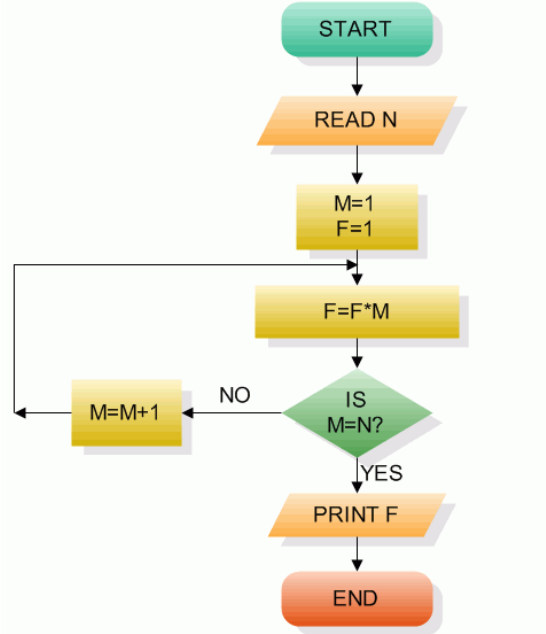
ISAT 252 - Analytical Methods IV

Programming and Problem Solving

Lab #2: Algorithms
Max 30 points



Due Date:

Objectives:

- Analyze some simple problems and be able to describe the program solution using a flowchart and pseudocode

Deliverables:

(**Two students per team**).

1. A printout of the answers to problems in this lab.
2. An e-copy of the answers to the problems in this lab.

Instructions:

PROBLEM 1:

You have been asked to write an algorithm that computes the maximum of three numbers x, y and z

1. Define the inputs for each task
2. Define the outputs
3. Use pseudocode to specify the algorithm that solves the task.
4. Write the same algorithm using a flowchart

PROBLEM 2

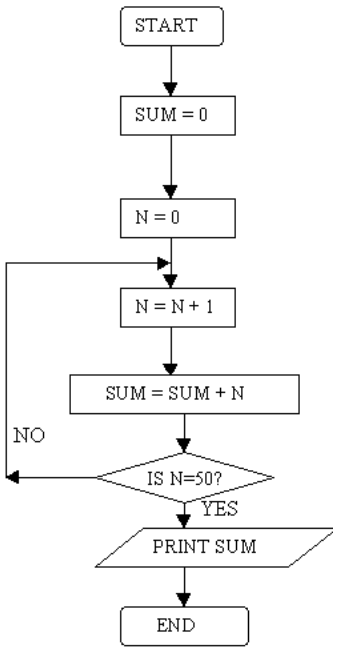
Write an algorithm to compute the sum of the first n terms of the harmonic series. The harmonic series is defined as follows

$$\sum_{k=1}^{\infty} \frac{1}{k}$$

The user will specify the number of terms, n, to be computed.

1. Define the inputs for each task
2. Define the outputs
3. Use pseudocode to specify the algorithm that solves the task.
4. Write the same algorithm using a flowchart

Hint: The flowchart below totals and prints the sum of first 50 integer numbers (so in this example N=50).



PROBLEM 3

You have been asked to write a program that will allow the user to enter a temperature. Your program should allow the user to do 2 separate tasks: a) Change the temperature from Celsius to Fahrenheit. b) Change the temperature from Fahrenheit to Celsius.

Sketch the hierarchy chart. For each task, complete these steps. Be sure to mark the pseudocode with input, process and/or output sections, if any.

1. Identify the tasks: draw the hierarchy of tasks related to the problem
2. Define the inputs for each task.
3. Define the outputs for each task.
4. Use pseudocode to specify the algorithm that solves each task.
5. Write the same algorithm using a flowchart