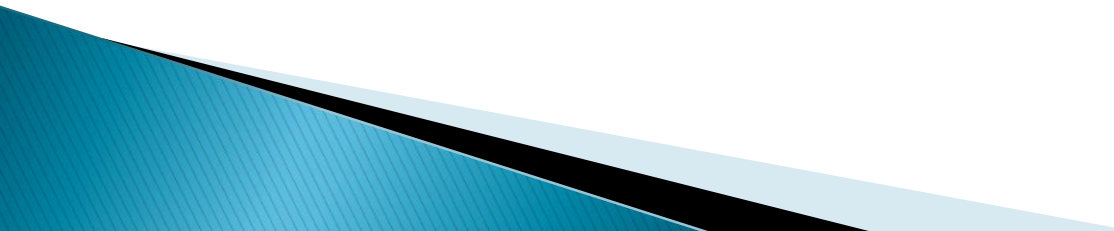


# Program Development Life Cycle

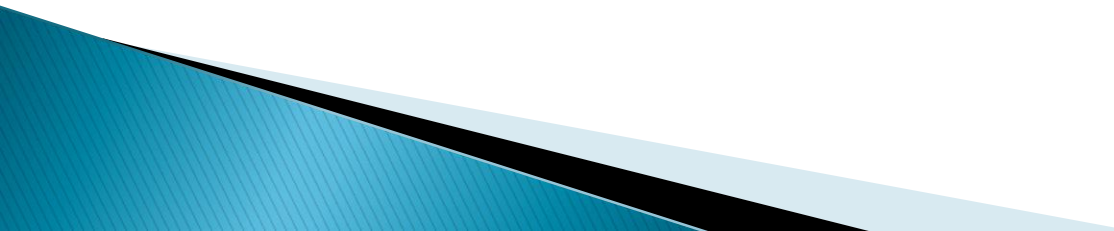
Joan M. Peralta  
CITCS

# Objectives:

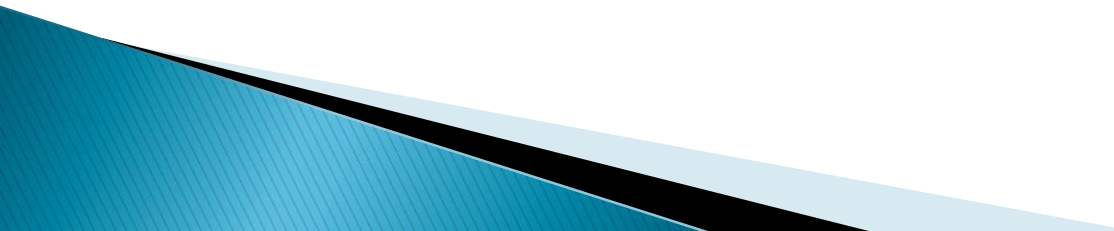
At the end of the lesson, students should be able to:

- ▶ Explain the process of problem solving;
  - ▶ Define an algorithm, and a flowchart;
  - ▶ Design a good algorithm;
  - ▶ Use flowcharting symbols to represent an algorithm.
- 

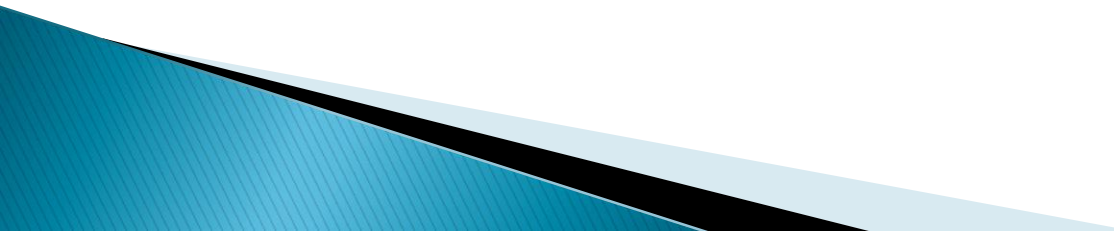
# Program Development Life Cycle

- Basic steps in trying to solve a problem on the computer:
    1. Problem Definition
    2. Problem Analysis
    3. Algorithm design and representation  
(Pseudocode or flowchart)
    4. Coding and debugging
- 

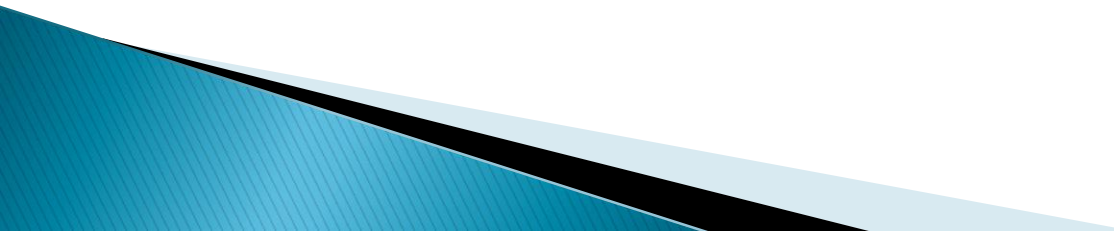
# 1. Problem Definition

- A clearly defined problem is already half the solution.
  - Computer programming requires us to define the problem first before we even try to create a solution.
- 

## 2. Problem Analysis

- After the problem has been adequately defined, the simplest and yet the most efficient and effective approach to solve the problem must be formulated.
  - Usually, this step involves breaking up the problem into smaller and simpler subproblems.
- 

# 3. Algorithm Design and representation

- Algorithm
    - a clear and unambiguous specification of the steps needed to solve a problem.
    - It may be expressed in either :
      - Human language (English, Tagalog)
      - Graphical representation like a flowchart
      - Pseudocode - which is a cross between human language and a programming language
- 

# The Flowchart

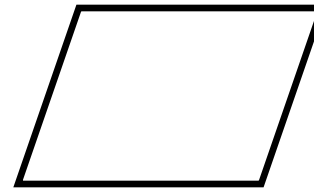
## A Flowchart

- shows logic of an algorithm
- emphasizes individual steps and their interconnections
- e.g. control flow from one action to the next

# Flowchart Symbols



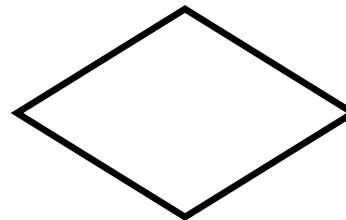
Terminal  
(Start/Stop)



Input/  
Output



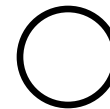
Process



Decision  
or Test



Flow Line



Connector



# 4. Coding and Debugging

- After constructing the algorithm, it is now possible to create the source code. Using the algorithm as basis, the source code can now be written using the chosen programming language.
- Debugging
  - The process of fixing some errors (bugs) in your program

# Problem1

## Problem Definition:

The radius of a circle is equal to one unit.

Compute the corresponding area of a circle and print out the value of the radius and the area.

## Problem Analysis:

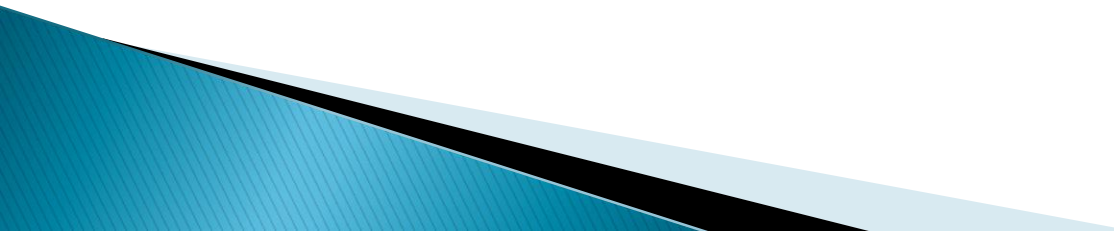
Input: radius, pi

Process:  $\text{area} = \text{radius} * \text{radius} * \pi$

Output: area

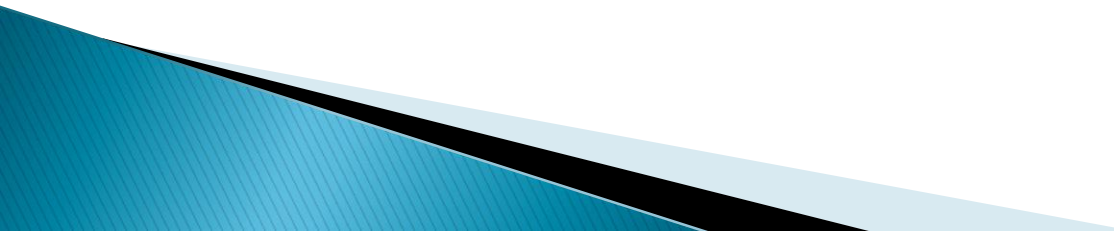


### Algorithm (Human Language):

1. Define the value of radius (R) and PI (3.1416)
  2. Calculate the area of the circle,  $\text{area} = R * R * \text{PI}$
  3. Print out the radius and the computed area.
- 

Coding:

```
public class ComputeArea
{
    public static void main(String []args)
    {
        int r=1;
        double PI=3.1416, area=0;
        area = r*r*PI;
        System.out.print(area+" "+r);
    }
}
```



# Problem 2

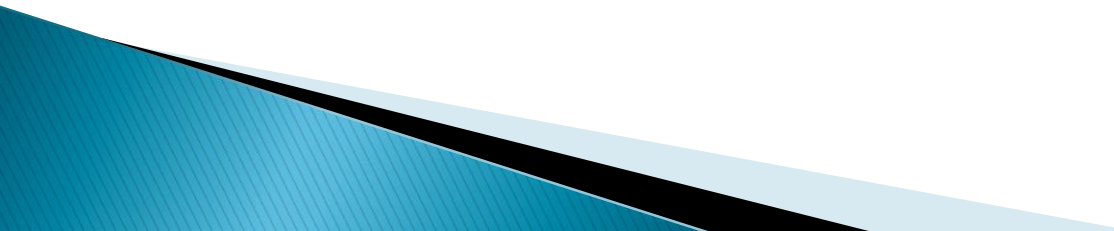
## Problem Definition:

Given three numbers A, B, and C. Compute and print out the sum, average and product of these values.

# Problem 3

## Problem Definition:

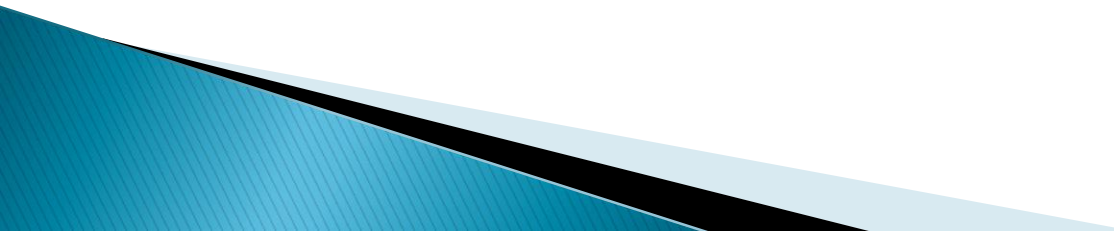
The ABC Manufacturing Company plans to give a year-end bonus to each of its employees. Compute the bonus of an employee. Consider the following criteria: if the employee's monthly salary is less than PhP1000, the bonus is 50% of the salary; for employees with salaries greater than PhP1000, the bonus is PhP1000. Print the name and the bonus of the employee.



# Problem 4

## Problem Definition:

Given two numbers  $x$  and  $y$ . Determine the difference between  $x$  and  $y$ . If the difference is negative, compute the sum of  $x$  and  $y$  and store to  $R$ ; if the difference is zero, compute the sum of twice  $x$  and twice  $y$  and store to  $R$ ; and if the difference is positive, compute the product of  $x$  and  $y$  and store to  $R$ . Print out the values of  $x$ ,  $y$  and  $R$ .



# Loops

- ▶ Counters
- ▶ Accumulator

## Steps in Loop Control

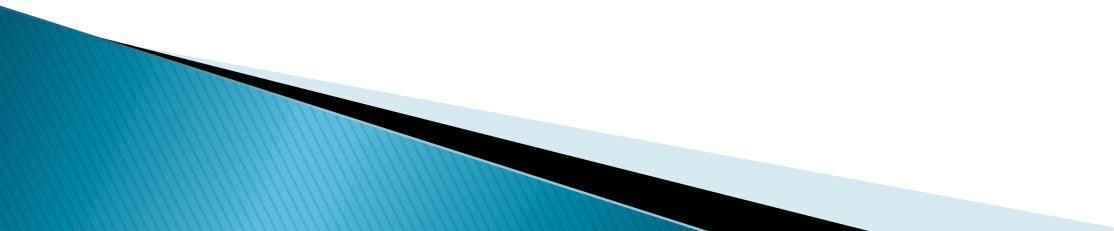
- ▶ Initialization
  - ▶ Test for Limit Conditions
  - ▶ Incrementation
- 



# Problem 5

## Problem Definition:

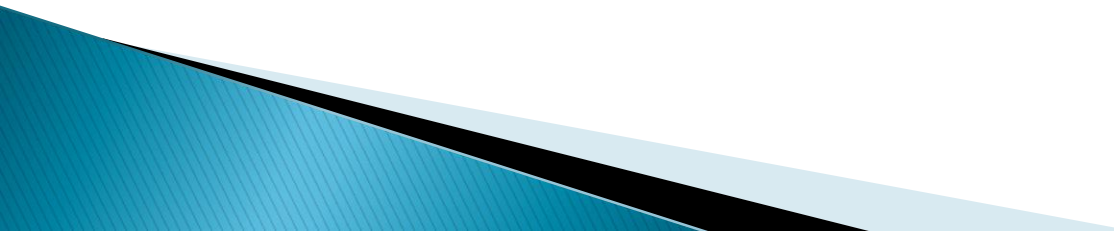
The initial value of the radius of a circle is equal to one unit and each succeeding radius is one unit greater than the value before it. Compute the area of the circle starting with  $r=1$  up to  $r=5$ , then print each radius and the corresponding area.



# Problem 6

## Problem Definition:

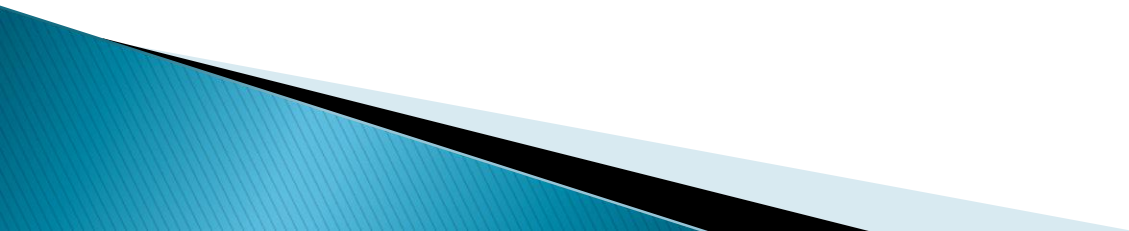
Draw a flowchart that reads and prints the names and individual scores of 100 students for a particular examination. Further, determine the average score and print it out.



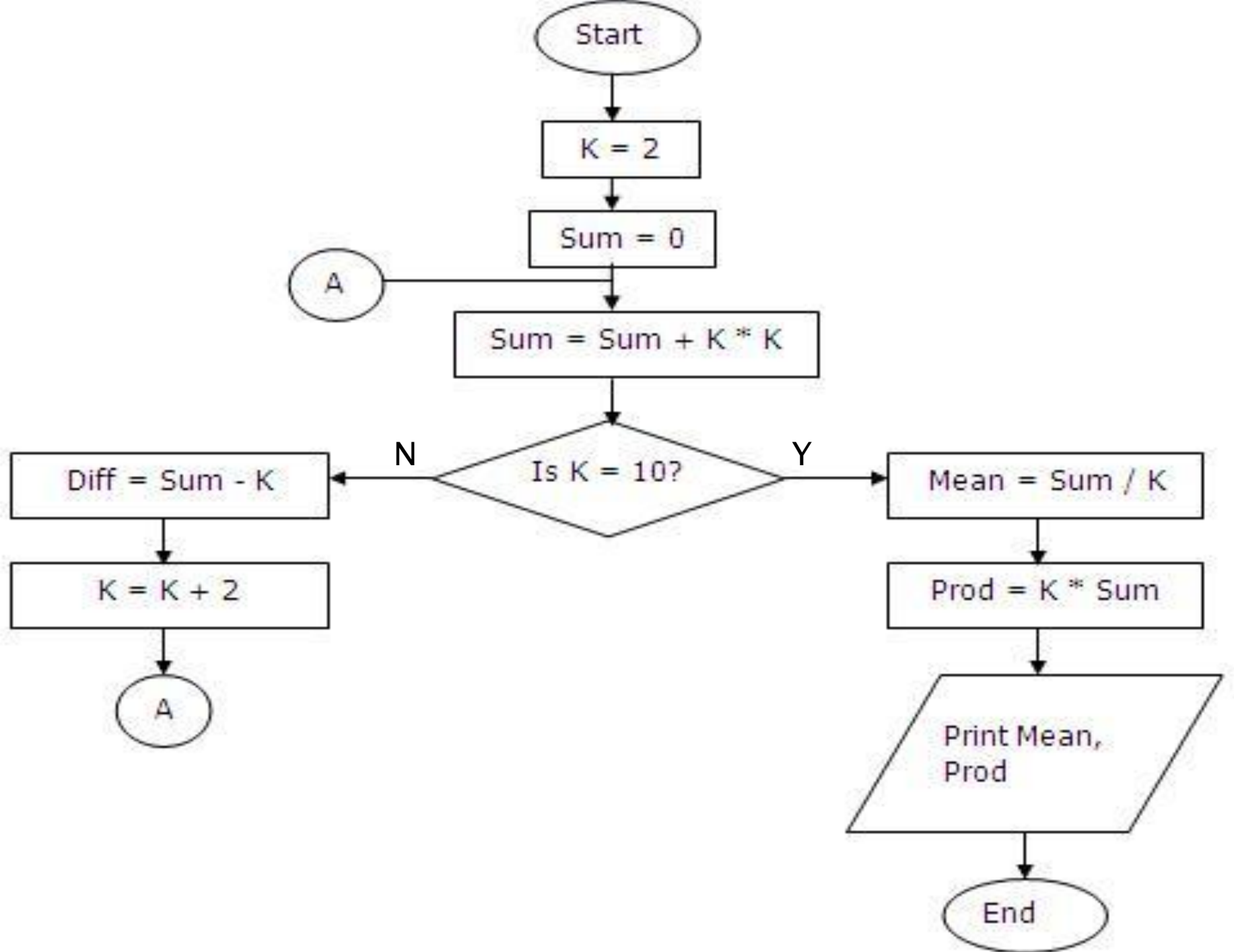
# Problem 7

## Problem Definition:

Draw a flowchart that prints the sum of positive integers from 1 to 5.



# Flowchart Tracing



- ▶ What is the final value of K?
  - ▶ What is the final value of Sum?
  - ▶ What is the final value of Diff?
  - ▶ What is the final value of Mean?
  - ▶ What is the final value of Prod?
- 