National University of Computer and Emerging Sciences

Lab Manual

for

Programming Fundamentals

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Lab Manual 08

Objectives

In this lab we will mainly perform activity

- pass by value
- pass by reference

Problem 1:

When an object is falling because of gravity, the following formula can be used to determine the distance the object falls in a specific time period:

$$d = 1/2 * g * t^2$$

The variables in the formula are as follows: d is the distance in meters, g is 9.8, and t is the amount of time, in seconds, that the object has been falling.
Write a function named falling Distance that accepts an object's falling time (in seconds) and distance as an argument. The function should calculate the distance, in meters, that the object has fallen during that time interval.

Function prototype look like this:
void Distance(int time, float &distance);

Write a program that demonstrates the function by calling it in a loop that passes the values 1 through 10 as arguments and displays the distance value.

Problem 2:

Write a program that inputs salary and grade passes to the function by reference.

The function adds the 50% bonus if the grade is greater than 15.It adds 25% bonus if the grade is 15 or less and calculate the total salary return back to the main function.

Problem 3:

In physics, an object that is in motion is said to have kinetic energy. The following formula can be used to determine a moving object's kinetic energy:

$$\mathbf{KE= 1/2\ m*v^2}$$

The variables in the formula are as follows: KE is the kinetic energy, m is the object's mass in kilograms, and v is the object's velocity, in meters per second.

Write a function named kinetic Energy that accepts an object's mass (in kilograms), velocity (in meters per second) and KE as arguments. Demonstrate the function by calling it in a program that asks the user to enter values for mass and velocity.

Function prototype look like this:

void kineticenergy (double mass, double velocity, double &KE);

Problem 4:

Write a program that input two integers from user then it called a function named **greatestcommondivisor** that accepts two numbers and GCD as arguments, the function finds greatest common divisor.
The GCD value passes by reference.
Function prototype look like this:

void greatestcommondivisor (int x, int y, int &GCD);

Problem 5:
Write a program that takes a number from user then it called a function named **factorial** that accept x as argument (pass by reference) that find factorial of that number. The function does not return anything. In main you print factorial of that number.

Problem 6:

Write a program that takes two numbers e.g., x and y from user, making functions **swapbyvalue** and **swapbyreference.**

Function prototype look like this:
void swapbyvalue(int x,int y);

void swapbyreference(int &x, int &y);

Both function swap its value and print value of x and y after swapping.

Note: Both functions do not return anything.

Output:

```
Enter x value: 5
Enter y value: 8

Swap function calling (swap by value)
After swapping x value is: 8
After Swapping y value is: 5
Swap function End

The value of x is: 5
The value of y is: 8

Swap function calling (swap by reference)
After swapping x value is: 8
After Swapping y value is: 5
Swap function End

The value of x is: 8
The value of y is: 5
```