**LAB EXERCISE 3**

**TOPIC: FUNCTIONS**

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## QUESTION 1

Describe the difference between predefined function and programmer-defined function?

**A predefined function** is a function that are already defined in a programming language's standard library and can be used by programmers. They are ready to use and do not require the programmer to write the implementation.

**A programmer-defined function** is a functions that the programmer creates to perform specific tasks. The programmer defines the function's name, parameters, and body. They are used to encapsulate code for reuse and better organization.

**QUESTION 2**

Write a statement to calculate the equation or to convert the statement below using function from library.

a) Square root of y.

```
#include <cmath>
double result = sqrt(y);
```

b) x to the power of y.

```
#include <cmath>
double result = pow(x, y);
```

c) cos x.

```
#include <cmath>
double result = cos(x);
```

d) Change character to uppercase.

```
#include <cctype>
char upperChar = toupper(character);
```

e) Copy the string of x into string y.

```
#include <cstring>
strcpy(y, x);
```

**QUESTION 3**

What is the difference between local variable, global variable, global constant and static local variable?

**Local Variable** variable that is declared within a function and can only be accessed within that function.

**Global Variable** is a variable that is declared outside of all functions and can be accessed from any function within the same file or across multiple files if declared as extern.

**Global Constant** is a constant that is declared outside of all functions and cannot be modified. It can be accessed from any function.

**Static Local Variable** is a local variable that retains its value between function calls. It is declared with the **static** keyword and is only accessible within the function it is declared in.

**QUESTION 4**

Given the following coding, fill in the blank with the "terms" of function as a comment.

```
#include <iostream>
using namespace std;
int average(int, int, int); //Function Prototype/Declaration
int main()
{
      int x, y, z, avrg;
      cout << "Please enter three numbers:" << endl;
      cin >> x >> y >> z;
      avrg = average (x, y, z); //Function Call
      cout << "The average of the given three numbers is: " <<
     avrg << endl;
      return 0;
}
int average(int a, int b, int c) //Function Definition
{
      int sum, avrg2;
      sum = a + b + c;
      avrg2 = sum / 3;
      return avrg2; //Return statement
}
```

**QUESTION 5**

Find the errors in the following given code.

```
#include <iostream>
#include <cmath>  //Error 1
using namespace std;
int average(int, int, int); //Error 2
int power (int p); //Error 3
int main()
{
 int x, y, z, avrg, powerOf;
 cout << "Please enter three numbers:" << endl;
 cin >> x >> y >> z;
 avrg = average (x, y, z); //Error 4
 cout << "The average of the given three numbers is: " << avrg <<
endl;
 power (avrg); //Error 5
 cout << "The average number to the power of two is: " << power
(avrg) << endl; //Error 6
return 0;
}
int average(int a, int b, int c)
{
 int sum, avrg2;
 sum = a + b + c;
 avrg2 = sum / 3;
 return avrg2; //Error 7
}
int power (int p)
{
 int pOf;
```

```
 pOf = pow(p,2);
 return pOf; // Error 8
}
```

**QUESTION 6**

Write a C++ program to calculate a rectangle's area. The program consists of the following function:

- `getLength` – This function should ask the user to enter the rectangle's length, and then returns that value as a double
- `getWidth` – This function should ask the user to enter the rectangle's width, and then returns that value as a double.
- `getArea` – This function should accept the rectangle's length and width as arguments and return the rectangle's area.
- `displayData` – This function should accept the rectangle's length, width and area as arguments, and display them in an appropriate message on the screen.
- `main` – This function consists of calls to the above functions.

```cpp
#include <iostream>
using namespace std;

double getLength();
double getWidth();
double getArea(double length, double width);
void displayData(double length, double width, double area);


int main()
{
    // Calling the functions
    // User to enter rectangle's length and width
    double length = getLength();
    double width = getWidth();

    // Calculate the area
    double area = getArea(length, width);

    // Display Data
    displayData(length, width, area);

    return 0;

}

double getLength()
{
    double length;
    cout << "Enter the rectangle's length: ";
    cin >> length;
    return length;
}

double getWidth()
{
    double width;
    cout << "Enter the rectangle's width: ";
    cin >> width;
    return width;
}

double getArea(double length, double width)
{
    return length * width;
}


void displayData(double length, double width, double area)
{
    cout << "Rectangle's Length: " << length << endl;
    cout << "Rectangle's Width: " << width << endl;
    cout << "Rectangle's Area: " << area << endl;
}
```

For Question 6, provide the answer in .cpp file.