**Fundamentals of Programming**

**Lab Journal - Lab # 11**

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Class: BS(CS) – 1 A

**Objective**

This lab will introduce the students to user defined functions in C++. It will cover passing by values and passing by reference.

**Exercise 1**

Give answers to the following.

|  |  |
| --- | --- |
| 1. | Write the declaration/prototype of a function named: power. This function compute x^n and returns a value.  Int power(int,int); |
| 2. | Write the function call for a function whose prototype is: int factorial(int) ;  factorial(x); |
| 3. | Which of these are valid function declarations/prototypes:   1. void function(); 2. void function(void); **NOT VALID** 3. void function(int); **NOT VALID** 4. void function(int, char); 5. function(int); 6. int function(); 7. int function(int, float); |

**Exercise 2**

Do as directed with the following code fragments.

|  |  |  |
| --- | --- | --- |
| 1. | int square(int);  int main()  {  for(int i=0;i<10;i+=2)  cout << square(i) << endl;  return 0;  }  int square(int a)  {  return a\*a;  } | Output: |
| 2. | int minimum(int,int);  int main()  {  int x=10,y=5;  int m = minimum(x,y);  cout<<m<<endl;  return 0;  }  int minimum(int a,int b)  {  if (a<b)  return a;  else  return b;  } | Output: |
| 3. | int main()  {  int x = 1, y = 3;  duplicate(x, y);  cout << "x=" << x << ", y=" << y;  return 0;  }  void duplicate(int a, int b)  {  a \*= 2;  b \*= 2;  } | Output: |
| 4 | //What will be the output now?  int main()  {  int x = 1, y = 3;  cout << "\nx=" << x << ", y=" << y;  duplicate(x, y);  cout << "\nx=" << x << ", y=" << y;  }  void duplicate(int &a, int &b)  {  a \*= 2;  b \*= 2;  } | Output:  What is the difference in the program 3 and 4?  In program 3 the copies of the values are modified.  In program 4 the real values are modified. |
| 5. | //Understand the scope of variable x from this code. Remember x is passed by value here.  void increment(int);  int main()  {  int x=10;  cout<< x <<endl;  increment(x);  cout<< x <<endl;  return 0;  }  void increment(int x)  {  x++;  cout<< x <<endl;  } | Output:    Why is the value of x not changing? Modify this code in such a way that the value of x will change. Note: The function should not return anything. Hint: Passing by Reference  void increment(int&x);  int main()  {  int x = 10;  cout << x << endl;  increment(x);  cout << x << endl;  system("pause");  return 0;  }  void increment(int &x)  {  x++;  cout << x << endl;  } |
| 6. | int main()  {  ShowMarks(75, 74.7, 'B');  }  void ShowMarks(int marks, float percentage, char grade)  {  cout << "Your marks are : " << marks<<endl;  cout << "Your percentage is : " << percentage << endl;  cout << "Your grade is : " << grade;  } | Output: |
| 7. | int main()  {  display();  }  void display()  {  cout << setw(10)<<"Welcome to my Program!\n";  cout << "I'm Umarah Qaseem. I'm proud to be a programmer.\n";  //Change this program and write your name above then display output  cout << "This is my Computer Programming Lab 11\n";  } | Output: |
| 8. | int main()  {  int x, choice;  cout << "Press 1 for Eatables Menu" << endl;  cout << "Press 2 for Drinks Menu" << endl;  cin >> x;  menu(x);  cin >> choice;  //A switch can be used below to operate on this choice  }  void menu(int a)  {  cout << "Welcome to our Cafe!\n";  if (a==1)  {  menu1();  }  else  {  menu2();  }  }  void menu1()  {  cout << "Displaying our first menu.\n";  cout << "Please choose from following.\n";  cout << "Press 1 for burgers\n";  cout << "Press 2 for sandwichs\n";  cout << "Press 3 for pizza\n";  }  void menu2()  {  cout << "Displaying our Second menu.\n";  cout << "Please choose from following.\n";  cout << "Press 1 for Cold Drinks\n";  cout << "Press 2 for Fresh Shakes\n";  cout << "Press 3 for Fresh Juices\n";  } | //Modify this program so that the function menu returns user’s choice instead of void. And Display the choice in main.  Modified Program:  #include<iostream>  #include<time.h>  #include<iomanip>  #include<ctype.h>  #include<cstring>  #include<string>  #include<math.h>  using namespace std;  int menu(int a);  int menu1();  int menu2();  int main()  {  int x, choice;  cout << "Press 1 for Eatables Menu" << endl;  cout << "Press 2 for Drinks Menu" << endl;  cin >> x;  choice = menu(x);  //A switch can be used below to operate on this choice  switch (choice)  {  case (1):  if (x == 1)  cout << "You choose Burgers from Eatable Menu " << endl;  else  cout << "You choose Cold Drinks from Drinkable menu" << endl;  break;  case (2):  if (x == 1)  cout << "You choose Sandwiches from Eatable Menu " << endl;  else  cout << "You choose Fresh Shakes from Drinkable menu" << endl;  break;  case (3):  if (x == 1)  cout << "You choose Pizza from Eatable Menu " << endl;  else  cout << "You choose Fresh Juice from Drinkable menu" << endl;  break;  default:  cout << "Wrong Selection";  }  system("pause");  }  int menu(int a)  {  cout << "Welcome to our Cafe!\n";  int b;  if (a == 1)  {  b = menu1();  }  else  {  b = menu2();  }  return b;  }  int menu1()  {  cout << "Displaying our first menu.\n";  cout << "Please choose from following.\n";  cout << "Press 1 for burgers\n";  cout << "Press 2 for sandwichs\n";  cout << "Press 3 for pizza\n";  int a;  cin >> a;  return a;  }  int menu2()  {  cout << "Displaying our Second menu.\n";  cout << "Please choose from following.\n";  cout << "Press 1 for Cold Drinks\n";  cout << "Press 2 for Fresh Shakes\n";  cout << "Press 3 for Fresh Juices\n";  int a;  cin >> a;  return a;  } |

**Exercise 3**

Write a program which asks the user to enter the width and height of a rectangle. Pass these values to a function ‘Area’ to compute the area of the rectangle. Display the area in the function main.

**Code :**

#include<iostream>

#include<time.h>

#include<iomanip>

#include<ctype.h>

#include<cstring>

#include<string>

#include<math.h>

using namespace std;

int area(int a, int b);

int main()

{

int base, hieght, product;

cout << "Enter Width value of rectangle : ";

cin >> base;

cout << "Enter Hieght value of rectangle : ";

cin >> hieght;

product = area(base, hieght);

cout << "Area of rectangle equal to " << product << endl;

system("pause");

}

int area(int a, int b)

{

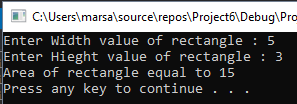
int product;

product = a \* b;

return product;

}

**Output :**



**Exercise 4**

Write a function that takes two integer arguments and returns the result of dividing the first by the second. The program should not attempt the division if the second number is zero, in this case it should return -1.

**Code :**

#include<iostream>

#include<time.h>

#include<iomanip>

#include<ctype.h>

#include<cstring>

#include<string>

#include<math.h>

using namespace std;

int divide(int a, int b);

int main()

{

int num, den, result;

cout << "Enter two numbers to find their result after dividing them together" << endl;

cout << "Numerator : ";

cin >> num;

cout << "Denominator : ";

cin >> den;

result = divide(num, den);

if (result == -1)

cout << "Cannot Divide by 0 : " << result << endl;

else

cout << "Value after division is : " << result << endl;

system("pause");

}

int divide(int a, int b)

{

int div;

if (b == 0)

return -1;

else

{

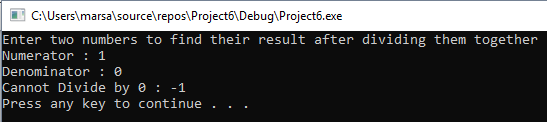
div = a / b;

return div;

}

}

**Output :**



**Exercise 5**

Write a program that take 3 float values as arguments. It returns the smallest of the three values.

**Code :**

#include<iostream>

#include<time.h>

#include<iomanip>

#include<ctype.h>

#include<cstring>

#include<string>

#include<math.h>

using namespace std;

float min(float x, float y, float z);

int main()

{

float a, b, c, result;

cout << "Enter three float values : " << endl;

cin >> a >> b >> c;

result = min(a, b, c);

cout << "Lowest value between three is : " << result << endl;

system("pause");

}

float min(float x, float y, float z)

{

float min;

if (x < y)

min = x;

if (z < min)

min = z;

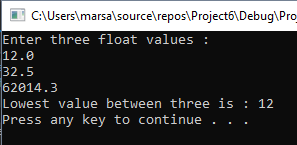
if (y < min)

min = y;

return min;

}

**Output :**



**Exercise 6**

Write a function that swaps the values of two numbers sent to it by reference. It does not return anything.

**Code:**

#include<iostream>

#include<time.h>

#include<iomanip>

#include<ctype.h>

#include<cstring>

#include<string>

#include<math.h>

using namespace std;

void swap(int &, int &);

int main()

{

int x, y;

cout << "Enter two values : " << endl;

cin >> x >> y;

cout << x << y << endl;

swap(x, y);

cout << x << y << endl;

system("pause");

}

void swap(int &a, int &b)

{

int temp = a;

a = b;

b = temp;

}

**Output:**

