Indian Institute of Technology Bombay, Mumbai
Department of CSE, Kanwal Rekhi Building
CS101 – Computer Programming
Autumn Semester 2014-2015

Lab Handout for Week 3 - 11/08/2014 to 15/08/2014

Objective: In this lab, you will practise writing, modifying, compiling, and executing C++ programs. The programs deal with assigment statement, logical expressions, and sequential and conditional execution. You required to read, compile and execute the programs mentioned in this lab handout.

Programming Examples

1. Read the code and predict the output of this program before executing it on the computer

```
#include<iostream>
using namespace std;
int main()
{
        int a,d;
        d=a=10;
        cout<<a<<" "<<d<<endl; //What shall be printed here?
        cout<<(a=5)<<endl; //Is there a problem with the syntax?
        cout<<a<<" "<<d<<endl;
        if(d==10&&a==10) { //Remember the precedence.
           d=100;
        }
        cout<<a<<" "<<d<<endl;
        if(d=2000&&a==5) //This needs special attention.
           d=1;
        cout<<a<<" "<<d<<endl;

        if(d==1||(a=0))
        a=20;
        cout<<a<<" "<<d<<endl;
        return 0;
}
```

File Name: *precedence*.cpp

2. Read the code and predict the output of this program before executing it on the computer. This program helps you understand the comparison between datatypes

```
#include<iostream>
using namespace std;
int main()
{
   float a = 1.1;
   double b = 1.1;
   // What do you think will output?
   if(a==b) //Comparing a float and double
```

```
      cout<<"A is equal to B"<<endl;
   else
      cout<<"A is not equal to B"<<endl;
   return 0;
}
```
File Name: *dataType*.cpp

3. Write a C++ Program to swap two numbers

```
#include<iostream>
using namespace std;
int main()
 {
            int var1, var2, swap;
            cout<<"Enter value for first integer:  ";
            cin>>var1;
            cout<<"Enter value for second integer:  ";
            cin>>var2;
            cout<<" Values Before swapping:  "<<endl;
            cout<<"First Integer ="<<var1<<endl;
            cout<<"Second Interger ="<<var2<<endl;
             swap=var1;
             var1=var2;
             var2=swap;
            cout<<" Values After swapping:  "<<endl;
            cout<<"First Integer ="<<var1<<endl;
            cout<<"Second Interger ="<<var2<<endl;
            return 0;
}
```
File Name: *swap1*.cpp

4. Write a C++ Program to swap two numbers without using 3rd variable

```
#include<iostream>
using namespace std;
int main()
{
            int var1, var2;
             cout<<"Enter value for first integer:  ";
             cin>>var1;
             cout<<"Enter value for second integer:  ";
             cin>>var2;
             cout<<" Values Before swapping:  "<<endl;
             cout<<"First Integer ="<<var1<<endl;
             cout<<"Second Interger ="<<var2<<endl;
            var1=var1+var2;
            var2=var1-var2;
            var1=var1-var2;
             cout<<" Values After swapping:  "<<endl;
             cout<<"First Integer ="<<var1<<endl;
             cout<<"Second Interger ="<<var2<<endl;
               return 0;
}
```
File Name: *swap2*.cpp

5. Write a C++ Program to take input from the user (1, 2 or 3) and print appropriate message

Input	**Message**
1	You have chosen to buy an iPad!
2	You have chosen to buy a Nokia tablet!
3	You have chosen to buy a Samsung Tablet!
None of these	Ah!You seem to want an Aakash Tablet. Great choice!

```
#include<iostream>
using namespace std;
int main()
{
	int choice;
	cout<<"Which Company do you prefer?" <<endl;

	cout<<"1. Apple"<<endl;
	cout<<"2. Nokia"<<endl;
	cout<<"3. Samsung"<<endl;
	cin>>choice;
	if(choice==1)
		cout<<"You have chosen to buy an iPad!"<<endl;

	else if(choice==2)
		cout<<"You have chosen to buy a Nokia tablet!"<<endl;
		 else if(choice==3)
			cout<<"You have chosen to buy a Samsung Tablet!"<<endl;
		 else
			cout<<"Ah!You seem to want an Aakash Tablet. Great choice!"<<endl;
	return 0;
}
```

File Name: *buyYourFavTablet.cpp*

6. Write a Program that performs operation on two integers and displays the result

```
#include<iostream>
using namespace std;
int main()
{
	int op, num1,num2,ans;

	//Display the operations that the program can perform
	cout<<"Which Operation do you want to perform?"<<endl;
	cout<<"1. Addition"<<endl;
	cout<<"2. Subtraction"<<endl;
	cout<<"3. Multiplication"<<endl;
	cout<<"4. Division"<<endl;
	cout<<"5. Remainder"<<endl;

	//Operation chosen
	cin>>op;

	cout<<"Enter the integers on which you want to perform the operation: "<<endl;
	cin>>num1>>num2;
```

```
        //Perform the operation and find the result
        switch(op)

        {
                case 1: ans = num1 + num2;
              break;
                case 2: ans = num1 - num2;
              break;
                case 3: ans = num1 * num2;
              break;
                case 4: if(num2!=0)
                                ans = num1/num2;
                        else
                                cout<<"division by 0 not allowed!"<<endl;
                 break;
              case 5: if(num2!=0)
                                ans = num1 % num2;
                          else
                                cout<<"division by 0 not allowed!"<<endl;
                 break;
                 default: cout<<"Not a defined operation!"<<endl;
        }
        //Display the answer
        cout<<"Answer is:"<<ans<<endl;
         return 0;
}
```

File Name: *operationOnInteger.cpp*

Programming Exercise

1.Write a C++ to determine whether the year entered by the user is leap year or not. Accept the input from the user in an integer veriable 'year'. Output error message if the number entered by the user is less than 0 or greater than 9999.

2. Write a C++ program to find out the grade of a student. Take input 'marks' from the user. Write this program using If and Else statements.

Marks	**Grade**
=>90	A
=>80&&<90	B
=>70&&<80	C
=>60&&<70	D
=>50&&<60	E
<50	F

Extra Programs (Optional)

1. Write a C++ program to display whether a triangle is right angled triangle or not given length of three sides as input.

```
#include <iostream>
using namespace std;
int main()
{
  int side_1, side_2, side_3, hypo_sq, rest_sq;
  cout << "Enter the length of three sides of the triangle: " << endl;
  cin >> side_1 >> side_2 >> side_3;
  if( side_1 > side_2 && side_1 > side_3){
   hypo_sq = side_1*side_1;
   rest_sq = side_2*side_2 + side_3*side_3;
  }
  else if (side_2 > side_3){
   hypo_sq = side_2*side_2;
   rest_sq = side_1*side_1 + side_3*side_3;
  }
  else{
   hypo_sq = side_3*side_3;
   rest_sq = side_1*side_1 + side_2*side_2;
  }
  if(hypo_sq == rest_sq)
    cout << "The given triangle is right angled." << endl;
  else
    cout << "The given triangle is not right angled." << endl;
  return 0;
}
```

Filename: CheckIfRightAngular.cpp

2. Write a C++ program to display the sum of two hexadecimal numbers in hexadecimal format when the two numbers are given as input.
Note: The digits A-F should be in the upper case. Possible modification is to remove this constraint.

```
#include <iostream>
using namespace std;
int main()
{
  char h11,h12,h21,h22,h13;
  int d11,d12,d21,d22,carry1=0,carry2=0;
  cout << "Enter the first hexadecimal number: " << endl;
  cin >> h12 >> h11 ;
  cout << "Enter the second hexadecimal number: " << endl;
  cin >> h22 >> h21 ;
  if( h11 >= 'A')
   d11=h11-'A'+10;
  else
   d11=h11-'0';
```

```
  if( h12 >= 'A')
   d12=h12-'A'+10;
  else
   d12=h12-'0';
  if( h21 >= 'A')
   d21=h21-'A'+10;
  else
   d21=h21-'0';
  if( h22 >= 'A')
   d22=h22-'A'+10;
  else
   d22=h22-'0';
  d11=d11+d21;
  if(d11>=16){
     d11=d11%16;
     carry1=1;
  }
  d12 = d22 + d12 + carry1;
  if(d12>=16){
     d12=d12%16;
     carry2=1;
  }
  cout << "The sum of the two numbers is : " ;
  h13 = '0' + carry2;
  if( d12 > 9)
   h12=d12-10+'A';
  else
   h12=d12+'0';
  if( d11 > 9)
   h11=d11-10+'A';
  else
   h11=d11+'0';
  if(carry2 !=0)
   cout << h13;
  cout << h12 << h11;
  return 0;
}
```

Filename: *sumHexNumber.cpp*