



# **CS-114 - Fundamentals of Programming**

## **Lab Manual # 02**

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## **Lab Manual # 05**

### **Repetition structures (II)**

#### **Objective:**

To understand repetition structure and the types of repetition structure.

#### **Lab Tasks:**

##### **Task 1:**

Convert the following while loop to a do-while loop:

```
int x = 1;
while (x > 0)
{
    cout << "enter a number: ";
    cin >> x;
}
```

#### **Code:**

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      int x = 1;
7      do
8      {
9          cout<<"Enter a number: ";
10         cin>>x;
11     }
12     while(x>0);
13
14     return 0;
15 }
```



### Output:

```
C:\Users\ayesh\Desktop\1st s... X + v
Enter a number: 5
Enter a number: 6
Enter a number: 0
-----
```

### Task 2:

Use a do-while loop to make a simple calculator for two numbers. Insert buttons for it to ask again and for termination.

### Code:

```
1  #include <iostream>
2  #include <cmath>
3  using namespace std;
4
5  int main()
6  {
7      char opr;
8      double x, y, result;
9      do
10     {
11         cout<<"Enter first number: ";
12         cin>>x;
13         cout<<"Enter second number: ";
14         cin>>y;
15
16         cout<<"Enter an operation (+, -, *, /, %, p for power) or 'q' to quit: ";
17         cin>>opr;
18
19         if(opr == 'q')
20         {
21             break;
22         }
23
24         switch(opr)
25         {
26             case '+':
27                 result = x + y;
28                 cout<<"result = "<<x<<" + "<<y<<" = "<<result<<endl;
29                 break;
30
31             case '-':
32                 result = x - y;
33                 cout<<"result = "<<x<<" - "<<y<<" = "<<result<<endl;
```



```

34         break;
35
36     case '*':
37         result = x * y;
38         cout<<"result = "<<x<<" * "<<y<<" = "<<result<<endl;
39         break;
40
41     case '/':
42         if(y!= 0)
43         {
44             result = x/y;
45             cout<<"result = "<<x<<" / "<<y<<" = "<<result<<endl;
46         }
47         else
48         {
49             cout<<"Error! Cannot divide by zero."<<endl;
50         }
51         break;
52
53     case '%':
54         result = fmod(x, y);
55         cout<<"result = "<<x<<" % "<<y<<" = "<<result<<endl;
56         break;
57
58     case 'p':
59         result = pow(x,y);
60         cout<<"result = "<<x<<"^"<<y<<" = "<<result<<endl;
61         break;
62
63     default:
64         cout<<"Error! Invalid operation."<<endl;
65
66     }
67     while (true);
68
69     return 0;
70 }

```



**Output:**

```
Enter first number: 5
Enter second number: 4
Enter an operation (+, -, *, /, %, p for power) or 'q' to quit: /
result = 5 / 4 = 1.25
Enter first number: 9
Enter second number: 6
Enter an operation (+, -, *, /, %, p for power) or 'q' to quit: %
result = 9 % 6 = 3
Enter first number: 20
Enter second number: 2
Enter an operation (+, -, *, /, %, p for power) or 'q' to quit: p
result = 20^2 = 400
Enter first number: 2
Enter second number: 4
Enter an operation (+, -, *, /, %, p for power) or 'q' to quit: q

-----
Process exited after 82.23 seconds with return value 0
Press any key to continue . . . |
```



### Task 3:

Write programs with while or do while loops that compute:

- The sum of all even numbers between 2 and 100 (inclusive).
- The sum of all squares between 1 and 100 (inclusive).

### Code:

```
1  #include <iostream>
2  #include <cmath>
3  using namespace std;
4
5  int main()
6  {
7      int sum1 = 0;
8      double sum2 = 0;
9      int i = 2;
10     int j = 1;
11
12     while(i>=2 && i<=100)
13     {
14         if(i%2==0)
15         {
16             sum1 += i;
17         }
18         i++;
19     }
20     cout<<"The sum of all even numbers between 2 and 100 (inclusive) is: "<<sum1<<endl;
21
22     while(j>=1 && j<=100)
23     {
24         sum2 = sum2 + pow(j, 2);
25         j++;
26     }
27     cout<<"The sum of all squares between 1 and 100 (inclusive) is: "<<sum2<<endl;
28
29     return 0;
30 }
```

### Output:

```
The sum of all even numbers between 2 and 100 (inclusive) is: 2550
The sum of all squares between 1 and 100 (inclusive) is: 338350
```

```
-----
Process exited after 0.06712 seconds with return value 0
Press any key to continue . . . |
```



#### **Task 4:**

Write programs with while or do while loops that compute:

- All powers of 2 from  $2^0$  up to  $2^{20}$ .
- The sum of all odd numbers between a and b (inclusive), where a and b are inputs.

#### **Code:**

```

1  #include <iostream>
2  #include <cmath>
3  using namespace std;
4
5  int main()
6  {
7      int i = 2;
8      int a, b, j, sum = 0;
9      double p;
10
11     cout<<"All powers of 2 from 2^0 up to 2^20 are: "<<endl;
12     while(i<=20)
13     {
14         p = pow(2, i);
15         cout<<"2^"<<i<<" = "<<p<<" ";
16         i++;
17     }
18
19     cout<<endl<<"Enter the value of a: ";
20     cin>>a;
21     cout<<"Enter the value of b: ";
22     cin>>b;
23
24     if(a%2==0)
25     {
26         j = a + 1;
27     }
28     else
29     {
30         j = a;
31     }
32     while(j<=b)
33     {
34         sum +=j;
35         j = j + 2;
36     }
37     cout<<"The sum of all odd numbers between "<<a<<" and "<<b<<" (inclusive) is: "<<sum<<endl;
38
39     return 0;
40 }

```

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**Output:**

```
All powers of 2 from 2^0 up to 2^20 are:
2^2 = 4 2^3 = 8 2^4 = 16 2^5 = 32 2^6 = 64 2^7 = 128 2^8 = 256 2^9 = 512 2^10 = 1024 2^11 = 2048 2^12 = 4096 2^13 = 8192
2^14 = 16384 2^15 = 32768 2^16 = 65536 2^17 = 131072 2^18 = 262144 2^19 = 524288 2^20 = 1.04858e+006
Enter the value of a: 5
Enter the value of b: 9
The sum of all odd numbers between 5 and 9 (inclusive) is: 21

-----
Process exited after 7.646 seconds with return value 0
Press any key to continue . . . |
```