

# **Operators, Conditional Statements, Loops, Functions, Arrays, Pointers and Structures**

## **OBJECT ORIENTED PROGRAMMING LAB**



### **ASSIGNMENT # 01**

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Session 2020-2024

## Operators

- 1) Write a C++ program that will convert dollar to rupees (Dollar to Rupees Conversion Calculator).

Code:

```
Q1.cpp X
Operators > Q1.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      float dollar,rupees;
6      cout<<"Enter the amount in dollers: ";
7      cin>>dollar;
8      rupees=dollar*157.05;           // The value I use for one dollar is 157.05 at my time
9      cout<<"The amount in rupees is: "<<rupees<<endl;
10     return 0;
11 }
12
```

Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Operators"
PS D:\oop_lab_assignment\Operators> & .\"Q1.exe"
Enter the amount in dollers: 10
The amount in rupees is: 1570.5
PS D:\oop_lab_assignment\Operators> █
```

- 2) Write a C++ program that will convert rupees to dollar (Rupees to Dollar Conversion Calculator).

Code:

```
Q2.cpp X
Operators > Q2.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      float rupees, dollar;
6      cout<<"Enter the amount in rupees: ";
7      cin>>rupees;
8      dollar=rupees*0.0064;           // The value I use for one dollar is 157.05 at my time.
9      cout<<"The amount in dollars is: "<<dollar<<endl;
10     return 0;
11 }
12
```

Output:

```
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Windows PowerShell
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Operators"
PS D:\oop_lab_assignment\Operators> & .\"Q2.exe"
Enter the amount in rupees: 100
The amount in dollars is: 0.64
PS D:\oop_lab_assignment\Operators> █
```

- 3) Write a C++ program that will convert centigrade to Fahrenheit.

Code:

```
Q3.cpp ×
Operators > Q3.cpp > main()
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      float centigrade, fahrenheit;
6      cout<<"Enter the temperature in Centigrade: ";
7      cin>>centigrade;
8      fahrenheit = (9.0 / 5.0 * centigrade) + 32;
9      cout<<"Temperatur in Fahrenheit is: "<<fahrenheit<<endl;
10     return 0;
11 }
```

Output:

```
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Windows PowerShell
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Operators"
PS D:\oop_lab_assignment\Operators> & .\"Q3.exe"
Enter the temperature in Centigrade: 32
Temperatur in Fahrenheit is: 89.6
PS D:\oop_lab_assignment\Operators> |
```

- 4) Take student name and marks of your 2nd semester from user and then generate DMC which will contain obtained marks out of total and percentage.

Code:

```
Q4.cpp X
Operators > Q4.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      string name_1;
6      float a,b,c,d,e,f,g,h,o_marks,percentage;
7      const float t_marks=800;
8      cout<<"Enter your name: ";
9      getline(cin,name_1);
10     cout<<"Enter your Applied Physics marks: ";
11     cin>>a;
12     cout<<"Enter your Calculus marks: ";
13     cin>>b;
14     cout<<"Enter your English marks: ";
15     cin>>c;
16     cout<<"Enter your English-Lab marks: ";
17     cin>>d;
18     cout<<"Enter your ICT-Lab marks: ";
19     cin>>e;
20     cout<<"Enter your Pakistan Studies marks: ";
21     cin>>f;
22     cout<<"Enter your Programming marks: ";
23     cin>>g;
24     cout<<"Enter your Programming-Lab marks: ";
25     cin>>h;
26     cout<<"-----"<<endl;
27     cout<<"Your marks in Applied Physics are "<<a<<endl;
28
29     cout<<"Your marks in Calculus are "<<b<<endl;
30
31     cout<<"Your marks in English are "<<c<<endl;
32
33     cout<<"Your marks in English-Lab are "<<d<<endl;
34
35     cout<<"Your marks in ICT-Lab are "<<e<<endl;
36
```

```

35     cout<<"Your marks in ICT-Lab are "<<e<<endl;
36
37     cout<<"Your marks in Pakistan Studies are "<<f<<endl;
38
39     cout<<"Your marks in Programming are "<<g<<endl;
40
41     cout<<"Your marks in Programming-Lab are "<<h<<endl;
42     cout<<"-----"<<endl;
43     o_marks = a+b+c+d+e+f+g+h;
44     percentage = (o_marks/t_marks)*100;
45     cout<<name_1<<endl;
46     cout<<"You obtained "<<o_marks <<" out of "<<t_marks<<" \nand your percentage is "<<percentage<<"%"<<endl;
47     cout<<"-----"<<endl;
48     return 0;
49 }

```

Output:

```

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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Operators"
PS D:\oop_lab_assignment\Operators> & .\"Q4.exe"
Enter your name: Saad Ahmad
Enter your Applied Physics marks: 89
Enter your Calculus marks: 78
Enter your English marks: 80
Enter your English-Lab marks: 85
Enter your ICT-Lab marks: 95
Enter your Pakistan Studies marks: 83
Enter your Programming marks: 78
Enter your Programming-Lab marks: 89
-----
Your marks in Applied Physics are 89
Your marks in Calculus are 78
Your marks in English are 80
Your marks in English-Lab are 85
Your marks in ICT-Lab are 95
Your marks in Pakistan Studies are 83
Your marks in Programming are 78
Your marks in Programming-Lab are 89
-----
Saad Ahmad
You obtained 677 out of 800
and your percentage is 84.625%
-----
PS D:\oop_lab_assignment\Operators>

```

- 5) In lab manual 2.3 math functions (Other Math Functions) are listed in the form of table you all are directed to implement all these functions using C++ program.

Code:

```
Q5.cpp
Operators > Q5.cpp > ...
1  #include<iostream>
2  #include<cmath>
3  using namespace std;
4  int main()
5  {
6      cout<<"Absolute value of -2 is: "<<abs(-2)<<endl;
7      cout<<"Arccosine of 1 is: "<<acos(1)<<endl;
8      cout<<"Arcsine of 1 is: "<<asin(1)<<endl;
9      cout<<"Arctangent of 1 is: "<<atan(1)<<endl;
10     cout<<"Cube root of 8 is: "<<cbrt(9)<<endl;
11     cout<<"Value of 89.99 rounded up to its nearest integer is: "<<ceil(89.99)<<endl;
12     cout<<"Cosine of 0 is: "<<cos(0)<<endl;
13     cout<<"Hyperbolic cosine of 1 is: "<<cosh(1)<<endl;
14     cout<<"Value of E to the power 2 is: "<<exp(2)<<endl;
15     cout<<"(e to the power 2) - 1 is: "<<expm1(2)<<endl;
16     cout<<"Absolute value of a floating -2.9 is: "<<fabs(-2.9)<<endl;
17     cout<<"Positive difference between 8 and 12 is: "<<fdim(8,12)<<endl;
18     cout<<"Value of 2.7 rounded down to its nearest integer is: "<<floor(2.7)<<endl;
19     cout<<"Square root of (5^2 + 3^2 ) without intermediate overflow or underflow is: "<<hypot(5, 3)<<endl;
20     cout<<"Value of 2*3+4 without losing precision is: "<<fma(2, 3, 4)<<endl;
21     cout<<"The highest value of a floating 2.56 and 7.5 is: "<<fmax(2.56 , 7.5)<<endl;
22     cout<<"The lowest value of a floating 2.56 and 7.5 is: "<<fmin(2.56 , 7.5)<<endl;
23     cout<<"The floating point remainder of 2.56/7.5 is: "<<fmod(2.56 , 7.5)<<endl;
24     cout<<"The value of 2 to the power of 3 is: "<<pow(2,3)<<endl;
25     cout<<"The sine of 5 (5 is in radians) is: "<<sin(5)<<endl;
26     cout<<"The hyperbolic sine of a double value is "<<sinh(3.1)<<endl;
27     cout<<"The tangent of 45 is: "<<tan(45)<<endl;
28     cout<<"The hyperbolic tangent of a double value is: "<<tanh(45)<<endl;
29     return 0;
30 }
```

Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Operators"
PS D:\oop_lab_assignment\Operators> & .\Q5.exe
Absolute value of -2 is: 2
Arccosine of 1 is: 0
Arcsine of 1 is: 1.5708
Arctangent of 1 is: 0.785398
Cube root of 8 is: 2.08008
Value of 89.99 rounded up to its nearest integer is: 90
Cosine of 0 is: 1
Hyperbolic cosine of 1 is: 1.54308
Value of E to the power 2 is: 7.38906
(e to the power 2) - 1 is: 6.38906
Absolute value of a floating -2.9 is: 2.9
Positive difference between 8 and 12 is: 0
Value of 2.7 rounded down to its nearest integer is: 2
Square root of (5^2 + 3^2 ) without intermediate overflow or underflow is: 5.83095
Value of 2*3+4 without losing precision is: 10
The highest value of a floating 2.56 and 7.5 is: 7.5
The lowest value of a floating 2.56 and 7.5 is: 2.56
The floating point remainder of 2.56/7.5 is: 2.56
The value of 2 to the power of 3 is: 8
The sine of 5 (5 is in radians) is: -0.958924
The hyperbolic sine of a double value is 11.0765
The tangent of 45 is: 1.61978
The hyperbolic tangent of a double value is: 1
PS D:\oop_lab_assignment\Operators> █
```



## Conditional Statements

### if else

1. Find positive and negative numbers using if else statement

Code:

```
Q1.cpp X
Conditional Statements > if else > Q1.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      long x;
6      cout<<"Enter the number: ";
7      cin>>x;
8      if (x>0)
9      {
10         cout<<x<<" is a positive number."<<endl;
11     }
12     else
13     {
14         cout<<x<<" is a negative number."<<endl;
15     }
16     return 0;
17 }
18 }
```

Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Conditional Statements\if else"
PS D:\oop_lab_assignment\Conditional Statements\if else> & .\"Q1.exe"
Enter the number: 34
34 is a positive number.
PS D:\oop_lab_assignment\Conditional Statements\if else> █
```

2. Find even and odd numbers using if else statement.

Code:

```
Q2.cpp X
Conditional Statements > if else > Q2.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      long x;
6      cout<<"Enter the number: ";
7      cin>>x;
8      if (x%2==0)
9      {
10         cout<<x<<" is a even number."<<endl;
11     }
12     else
13     {
14         cout<<x<<" is a odd number."<<endl;
15     }
16     return 0;
17 }
18 }
```

Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Conditional Statements\if else"
PS D:\oop_lab_assignment\Conditional Statements\if else> & .\"Q2.exe"
Enter the number: 2347
2347 is a odd number.
PS D:\oop_lab_assignment\Conditional Statements\if else> |
```

- Find leap year using if else statement.

Code:

```
Q3.cpp X
Conditional Statements > if else > Q3.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      int year;
6      cout<<"Enter the year: ";
7      cin>>year;
8      if (year%4==0 && year%100!=0 || year%400==0)
9      {
10         cout<<"It is a leap year."<<endl;
11     }
12     else
13     {
14         cout<<"It is not a leap year."<<endl;
15     }
16 }
17
```

Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Conditional Statements\if else"
PS D:\oop_lab_assignment\Conditional Statements\if else> & .\"Q3.exe"
Enter the year: 2323
It is not a leap year.
PS D:\oop_lab_assignment\Conditional Statements\if else> |
```

4. Write a C++ program which will get two numbers from user and find large number between them using if else statement. Leap year Hints: common year has 365 days (feb 28 days) Leap year has 366 days (feb 29 days)  $\text{year} \% 4 == 0$  leap year

Code:

```
Q4.cpp ×
Conditional Statements > if else > Q4.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      int n1,n2;
6      cout<<"Enter the first number: ";
7      cin>>n1;
8      cout<<"Enter the second number: ";
9      cin>>n2;
10     if (n1>n2)
11     {
12         cout<<n1<<" largest than "<<n2<<endl;
13     }
14     else
15     {
16         cout<<n1<<" smallest than "<<n2<<endl;
17     }
18 }
19
```

Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Conditional Statements\if else"
PS D:\oop_lab_assignment\Conditional Statements\if else> & .\"Q4.exe"
Enter the first number: 23
Enter the second number: 556
23 smallest than 556
PS D:\oop_lab_assignment\Conditional Statements\if else> |
```

## if-else-if else

1. Find positive, negative and neutral numbers using if-else-if else statement.

Code:

```
Q1.cpp X
Conditional Statements > if-else-if else > Q1.cpp > main()
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      int x;
6      cout<<"Enter the number: ";
7      cin>>x;
8      if (x>0)
9      {
10         cout<<x<<" is a positive number."<<endl;
11     }
12     else if (x<0)
13     {
14         cout<<x<<" is a negative number."<<endl;
15     }
16
17     else
18     {
19         cout<<x<<" is a neutral number."<<endl;
20     }
21 }
```

Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Conditional Statements\if-else-if else"
PS D:\oop_lab_assignment\Conditional Statements\if-else-if else> & .\"Q1.exe"
Enter the number: -23
-23 is a negative number.
PS D:\oop_lab_assignment\Conditional Statements\if-else-if else> |
```

2. Take value of temperature from user and find status of weather accordingly.

Code:

```
Q2.cpp X
Conditional Statements > if-else-if else > Q2.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      float temperature;
6
7      cout << "Today's Temperature : ";
8      cin >> temperature;
9
10     if (temperature > 35)
11     {
12         cout << "Forecast : Today is a HOT day"<<endl;
13     }
14     else if (temperature >= 25 && temperature <= 35)
15     {
16         cout << "Forecast : Today is a PLEASANT day"<<endl;
17     }
18     else if (temperature < 25)
19     {
20         cout << "Forecast : Today is a COOL day"<<endl;
21     }
22     else
23     {
24         cout << "The entered value is NOT valid"<<endl;
25     }
26     return 0;
27 }
```

## Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Conditional Statements\if-else-if else"
PS D:\oop_lab_assignment\Conditional Statements\if-else-if else> & .\"Q2.exe"
Today's Temperature : 24
Forecast : Today is a COOL day
PS D:\oop_lab_assignment\Conditional Statements\if-else-if else> █
```

3. Take value of percentage from user and find grades based on percentage value.

Code:

```
Q3.cpp X
Conditional Statements > if-else-if else > Q3.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      float percentage;
6
7      cout << "Enter marks percentage : ";
8      cin >> percentage;
9
10     if (percentage >= 90 && percentage <= 100)
11     {
12         cout << "Your grade is A."<<endl;
13     }
14     else if (percentage >= 80 && percentage < 90 )
15     {
16         cout << "Your grade is B."<<endl;
17     }
18     else if (percentage >= 70 && percentage < 79.99 )
19     {
20         cout << "Your grade is C."<<endl;
21     }
22     else if (percentage >= 50 && percentage < 69.99 )
23     {
24         cout << "Your grade is D."<<endl;
25     }
26     else
27     {
28         cout << "Your grade is F."<<endl;
29     }
30
31
32     return 0;
33 }
```



## Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Conditional Statements\if-else-if else"
PS D:\oop_lab_assignment\Conditional Statements\if-else-if else> & .\"Q3.exe"
Enter marks percentage : 87
Your grade is B.
PS D:\oop_lab_assignment\Conditional Statements\if-else-if else> |
```

4. Make a calculator using if-else-if else statement which perform the addition, subtraction, multiplication, division and remainder operations. Take values and operator from user on runtime.

Code:

```
Q4.cpp X
Conditional Statements > if-else-if else > Q4.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      float a,b;
6      char ch;
7      cout<<"Enter first number: ";
8      cin>>a;
9      cout<<"Enter second nubmer: ";
10     cin>>b;
11     cout<<"What operation you want to perform?"<<endl;
12     cout<<"For Addition press + "<<endl;
13     cout<<"For Subtraction press - "<<endl;
14     cout<<"For Multiplication press * "<<endl;
15     cout<<"For Division press / "<<endl;
16     cin>>ch;
17     if (ch == '+')
18     {
19         cout<<"The addition of "<<a<<" and "<<b<<" is "<<a+b<<endl;
20     }
21     else if (ch == '-')
22     {
23         cout<<"The subtraction of "<<a<<" and "<<b<<" is "<<a-b<<endl;
24     }
25     else if (ch == '*')
26     {
27         cout<<"The multiplication of "<<a<<" and "<<b<<" is "<<a*b<<endl;
28     }
29     else if (ch == '/')
30     {
31         cout<<"The division of "<<a<<" and "<<b<<" is "<<a/b<<endl;
32     }
33     else
34     {
35         cout<<"Please enter the correct character."<<endl;
36     }
37 }
```

Output:

```

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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Conditional Statements\if-else-if else"
PS D:\oop_lab_assignment\Conditional Statements\if-else-if else> & .\"Q4.exe"
Enter first number: 23
Enter second nubmer: 969596
What operation you want to perform?
For Addition press +
For Subtraction press -
For Multiplication press *
For Division press /
/
The division of 23 and 969596 is 2.37212e-005
PS D:\oop_lab_assignment\Conditional Statements\if-else-if else>

```

## Conditional Operator (?:)

1. Write a C++ program which will get two numbers from user and find large number between them using conditional operator.

Code:

```

Q1.cpp  X
Conditional Statements > Conditional Operator > Q1.cpp > main()
1  #include<iostream>
2
3  using namespace std;
4
5  int main()
6
7  {
8      int num_1,num_2;
9      cout<<"Enter first number: ";
10     cin>>num_1;
11     cout<<"Enter second number: ";
12     cin>>num_2;
13     int result = (num_1>num_2) ? num_1 : num_2;
14     cout<<result<<" is largest number."<<endl;;
15     return 0;
16 }

```

Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Conditional Statements\Conditional Operator"
PS D:\oop_lab_assignment\Conditional Statements\Conditional Operator> & .\"Q1.exe"
Enter first number: 23
Enter second number: 56
56 is largest number.
PS D:\oop_lab_assignment\Conditional Statements\Conditional Operator> |
```

2. Find positive and negative numbers using conditional operator.

Code:

```
Q2.cpp  X
Conditional Statements > Conditional Operator > Q2.cpp > main()

1  #include<iostream>
2
3  using namespace std;
4
5  int main()
6  {
7      int num;
8      cout<<"Enter a number: ";
9      cin>>num;
10     int result = (num>0) ? true : false ;
11     if (result == true)
12     {
13         cout<<"It is a positive number."<<endl;
14     }
15     else
16     {
17         cout<<"it is a negative number."<<endl;
18     }
19
20
21     return 0;
22 }
```

Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Conditional Statements\Conditional Operator"
PS D:\oop_lab_assignment\Conditional Statements\Conditional Operator> & .\"Q2.exe"
Enter a number: 12
It is a positive number.
PS D:\oop_lab_assignment\Conditional Statements\Conditional Operator> █
```

3. Find even and odd numbers using conditional operator.

Code:

```
Q3.cpp  X
Conditional Statements > Conditional Operator > Q3.cpp > main()

1  #include<iostream>
2
3  using namespace std;
4
5  int main()
6
7  {
8      int num;
9      cout<<"Enter a number: ";
10     cin>>num;
11     int result = (num%2==0) ? true : false ;
12     if (result == true)
13     {
14         cout<<"It is a even number."<<endl;
15     }
16     else
17     {
18         cout<<"it is a odd number."<<endl;
19     }
20
21     return 0;
22 }
```

## Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Conditional Statements\Conditional Operator"
PS D:\oop_lab_assignment\Conditional Statements\Conditional Operator> & .\Q3.exe
Enter a number: 45
it is a odd number.
PS D:\oop_lab_assignment\Conditional Statements\Conditional Operator> █
```

## Switch Statement

1. Make a C++ calculator using switch statement which perform the following addition, subtraction, multiplication, division and remainder value. Take value and operator from user on runtime.

Code:

```
Q1.cpp ×
Conditional Statements > Switch Statement > Q1.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      float a,b;
6      char ch;
7      cout<<"Enter first number: ";
8      cin>>a;
9      cout<<"Enter second nubmer: ";
10     cin>>b;
11     cout<<"What operation you want to perform?"<<endl;
12     cout<<"For Addition press + "<<endl;
13     cout<<"For Subtraction press - "<<endl;
14     cout<<"For Multiplication press * "<<endl;
15     cout<<"For Division press / "<<endl;
16     cin>>ch;
17
18     switch (ch)
19     {
20     case '+':
21         cout<<"The addition of "<<a<<" and "<<b<<" is "<<a+b<<endl;
22         break;
23     case '-':
24         cout<<"The subtraction of "<<a<<" and "<<b<<" is "<<a-b<<endl;
25     case '*':
26         cout<<"The multiplication of "<<a<<" and "<<b<<" is "<<a*b<<endl;
27         break;
28     case '/':
29         cout<<"The division of "<<a<<" and "<<b<<" is "<<a/b<<endl;
30         break;
31     default:
32         cout<<"Please enter the correct character."<<endl;
33         break;
34     }
35 }
```

Output:

```
TERMINAL  OUTPUT  PROBLEMS  DEBUG CONSOLE

Windows PowerShell
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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Conditional Statements\Switch Statement"
PS D:\oop_lab_assignment\Conditional Statements\Switch Statement> & .\"Q1.exe"
Enter first number: 34
Enter second nubmer: 64
What operation you want to perform?
For Addition press +
For Subtraction press -
For Multiplication press *
For Division press /
-
The subtraction of 34 and 64 is -30
The multiplication of 34 and 64 is 2176
PS D:\oop_lab_assignment\Conditional Statements\Switch Statement> |
```

2. Write a C++ program using switch statement which get month name from user and display month number accordingly.



Code:

```
Q2.cpp X
Conditional Statements > Switch Statement > Q2.cpp > main()
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      int num;
6      cout<<"Enter month number: ";
7      cin>>num;
8      switch (num)
9      {
10         case 1:
11             cout<<"January"<<endl;
12             break;
13         case 2:
14             cout<<"February"<<endl;
15             break;
16         case 3:
17             cout<<"March"<<endl;
18             break;
19         case 4:
20             cout<<"April"<<endl;
21             break;
22         case 5:
23             cout<<"May"<<endl;
24             break;
25         case 6:
26             cout<<"June"<<endl;
27             break;
28         case 7:
29             cout<<"July"<<endl;
30             break;
31         case 8:
32             cout<<"August"<<endl;
33             break;
34         case 9:
35             cout<<"September"<<endl;
36             break;
```

```
34     case 9:
35         cout<<"September"<<endl;
36         break;
37     case 10:
38         cout<<"October"<<endl;
39         break;
40     case 11:
41         cout<<"November"<<endl;
42         break;
43     case 12:
44         cout<<"December"<<endl;
45         break;
46     default:
47         cout<<"Please enter the correct number!!"<<endl;
48         break;
49     }
50 }
51
```

Output:

```
TERMINAL  OUTPUT  PROBLEMS  DEBUG CONSOLE

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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Conditional Statements\Switch Statement"
PS D:\oop_lab_assignment\Conditional Statements\Switch Statement> & .\"Q2.exe"
Enter month number: 6
June
PS D:\oop_lab_assignment\Conditional Statements\Switch Statement> █
```

# Loops

## for loop

1. Write a C++ program which display first 10 number using for loop.

Code:

```
Q1.cpp X
Loop > for loop > Q1.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      for (int i = 1; i <= 10; i++)
6      {
7          cout<<i<<endl;
8      }
9
10 }
```

Output:

```
TERMINAL  OUTPUT  PROBLEMS  DEBUG CONSOLE
Windows PowerShell
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Loop\for loop"
PS D:\oop_lab_assignment\Loop\for loop> & .\"Q1.exe"
1
2
3
4
5
6
7
8
9
10
PS D:\oop_lab_assignment\Loop\for loop> █
```

2. Write a C++ program which display even and odd number using for loop.

Code:

```
Q2.cpp X
Loop > for loop > Q2.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      cout<<"Even numbers"<<endl;
6      for (int i = 1; i <= 10; i++)
7      {
8          if (i%2==0)
9          {
10             cout<<i<<endl;
11         }
12     }
13     cout<<endl;
14     cout<<"Odd numbers"<<endl;
15     for (int j = 1; j <= 10; j++)
16     {
17         if (j%2 != 0)
18         {
19             cout<<j<<endl;
20         }
21     }
22 }
23
24
25 }
```

Output:

```
TERMINAL  OUTPUT  PROBLEMS  DEBUG CONSOLE

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Loop\for loop"
PS D:\oop_lab_assignment\Loop\for loop> & .\Q2.exe
Even numbers
2
4
6
8
10

Odd numbers
1
3
5
7
9
PS D:\oop_lab_assignment\Loop\for loop> |
```

3. Take a number from user and make a table of that number using for loop.

Code:

```
Q3.cpp  X
Loop > for loop > Q3.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      int n;
6      cout<<"Enter the number: ";
7      cin>>n;
8      for (int i = 1; i <= 10; i++)
9      {
10         cout<<n<<" * "<<i<<" = "<<n*i<<endl;
11     }
12
13 }
```

Output:

```
TERMINAL  OUTPUT  PROBLEMS  DEBUG CONSOLE

PS D:\oop_lab_assignment\Loop\for loop> & .\"Q3.exe"
Enter the number: 3
3 * 1 = 3
3 * 2 = 6
3 * 3 = 9
3 * 4 = 12
3 * 5 = 15
3 * 6 = 18
3 * 7 = 21
3 * 8 = 24
3 * 9 = 27
3 * 10 = 30
PS D:\oop_lab_assignment\Loop\for loop> █
```

4. Take a number from user and find factorial of that number using for loop.

Code:

```
Q4.cpp  X
Loop > for loop > Q4.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      int n, fac=1;
6      cout<<"Enter the number: ";
7      cin>>n;
8      for (int i = 1; i <= n; i++)
9      {
10         fac*=i;
11     }
12     cout<<fac<<endl;
13
14     return 0;
15 }
```

Output:

```
TERMINAL  OUTPUT  PROBLEMS  DEBUG CONSOLE

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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Loop\for loop"
PS D:\oop_lab_assignment\Loop\for loop> & .\"Q4.exe"
Enter the number: 5
120
PS D:\oop_lab_assignment\Loop\for loop> █
```

## while loop

1. Write a C++ program which display first 10 number using while loop.

Code:

```
Q1.cpp  X
Loop > while loop > Q1.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      int i=0;
6      while (i<=10)
7      {
8          cout<<i<<endl;
9          i++;
10     }
11 }
12
```

Output:

```
TERMINAL  OUTPUT  PROBLEMS  DEBUG CONSOLE

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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Loop\while loop"
PS D:\oop_lab_assignment\Loop\while loop> & .\"Q1.exe"
0
1
2
3
4
5
6
7
8
9
10
PS D:\oop_lab_assignment\Loop\while loop> █
```



2. Write a C++ program which display even and odd number using while loop.

Code:

```
Q2.cpp X
Loop > while loop > Q2.cpp > main()
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      int i=0, j=0;
6      cout<<"Even numbers"<<endl;
7      while (i<=10)
8      {
9          if (i%2==0)
10         {
11             cout<<i<<endl;
12         }
13         i++;
14     }
15     cout<<endl;
16     cout<<"Odd numbers"<<endl;
17     while (j<=10)
18     {
19         if (j%2 != 0)
20         {
21             cout<<j<<endl;
22         }
23         j++;
24     }
25 }
26
27
28
```

Output:

```
TERMINAL  OUTPUT  PROBLEMS  DEBUG CONSOLE

Windows PowerShell
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Try the new cross-platform PowerShell https://aka.ms/powershell

PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Loop\while loop"
PS D:\oop_lab_assignment\Loop\while loop> & .\"Q2.exe"
Even numbers
0
2
4
6
8
10

Odd numbers
1
3
5
7
9
PS D:\oop_lab_assignment\Loop\while loop> █
```

3. Take a number from user and make a table of that number using while loop.

Code:

```
Q3.cpp X
Loop > while loop > Q3.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      int n , i=1;
6      cout<<"Enter the number: ";
7      cin>>n;
8
9      while (i<=10)
10     {
11         cout<<n<<" * "<<i<<" = "<<n*i<<endl;
12         i++;
13     }
14 }
15
```

Output:

```
TERMINAL  OUTPUT  PROBLEMS  DEBUG CONSOLE
PS D:\oop_lab_assignment\Loop\while loop> & .\"Q3.exe"
Enter the number: 5
5 * 1 = 5
5 * 2 = 10
5 * 3 = 15
5 * 4 = 20
5 * 5 = 25
5 * 6 = 30
5 * 7 = 35
5 * 8 = 40
5 * 9 = 45
5 * 10 = 50
PS D:\oop_lab_assignment\Loop\while loop> █
```

4. Take a number from user and find factorial of that number using while loop.

Code:

```

Q4.cpp X
Loop > while loop > Q4.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      int n, fac=1,i=1;
6      cout<<"Enter a number: ";
7      cin>>n;
8      while (i<=n)
9      {
10         fac*=i;
11         i++;
12     }
13     cout<<fac<<endl;
14     return 0;
15 }

```

Output:

```

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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Loop\while loop"
PS D:\oop_lab_assignment\Loop\while loop> & .\"Q4.exe"
Enter a number: 7
5040
PS D:\oop_lab_assignment\Loop\while loop>

```

5. Make a calculator using if-else-if else statement which perform the addition, subtraction, multiplication, division and remainder operations. Take values and operator from user on runtime. Use while loop for user choice. Means after performing one operation program will ask from user "do you want to do another calculation(yes/no)?". If user press yesthen user will enter number 1, number 2 and operator for calculation and if user press no then terminate the loop.

Code:

```
Q5.cpp X
Loop > while loop > Q5.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      float a,b;
6      char ch;
7      int choice;
8      while(choice != 2)
9      {
10         cout<<"Enter first number: ";
11         cin>>a;
12         cout<<"Enter second nubmer: ";
13         cin>>b;
14         cout<<"What operation you want to perform?"<<endl;
15         cout<<"For Addition press + "<<endl;
16         cout<<"For Subtraction press - "<<endl;
17         cout<<"For Multiplication press * "<<endl;
18         cout<<"For Division press / "<<endl;
19         cin>>ch;
20
21         if (ch == '+')
22         {
23             cout<<"The addition of "<<a<<" and "<<b<<" is "<<a+b<<endl;
24         }
25         else if (ch == '-')
26         {
27             cout<<"The subtraction of "<<a<<" and "<<b<<" is "<<a-b<<endl;
28         }
29         else if (ch == '*')
30         {
31             cout<<"The multiplication of "<<a<<" and "<<b<<" is "<<a*b<<endl;
32         }
33     }
```

```

29     else if (ch == '*')
30     {
31         cout<<"The multiplication of "<<a<<" and "<<b<<" is "<<a*b<<endl;
32     }
33     else if (ch == '/')
34     {
35         cout<<"The division of "<<a<<" and "<<b<<" is "<<a/b<<endl;
36     }
37     else
38     {
39         cout<<"Please enter the correct character."<<endl;
40     }
41     cout<<"Do you want to do another calculation?"<<endl<<"1.Yes"<<endl<<"2.No "<<endl;
42     cin>>choice;
43 }
44 }

```

Output:

```

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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Loop\while loop"
PS D:\oop_lab_assignment\Loop\while loop> & .\"Q5.exe"
Enter first number: 12
Enter second nubmer: 12
What operation you want to perform?
For Addition press +
For Subtraction press -
For Multiplication press *
For Division press /
/
The division of 12 and 12 is 1
Do you want to do another calculation?
1.Yes
2.No
2
PS D:\oop_lab_assignment\Loop\while loop>

```

## do while loop

1. Write a C++ program which display first 10 number using do while loop.

Code:

```
Q1.cpp X
Loop > do while loop > Q1.cpp
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      int i=0;
6      do
7      {
8          cout<<i<<endl;
9          i++;
10     }
11     while (i<=10);
12
13 }
```

Output:

```
TERMINAL  OUTPUT  PROBLEMS  DEBUG CONSOLE

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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Loop\do while loop"
PS D:\oop_lab_assignment\Loop\do while loop> & .\"Q1.exe"
0
1
2
3
4
5
6
7
8
9
10
PS D:\oop_lab_assignment\Loop\do while loop> █
```

2. Write a C++ program which display even and odd number using while loop.

Code:

```
Q2.cpp ×
Loop > do while loop > Q2.cpp > main()
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      int i=0, j=0;
6      cout<<"Even numbers"<<endl;
7
8      do
9      {
10         if (i%2==0)
11         {
12             cout<<i<<endl;
13         }
14         i++;
15     }
16     while (i<=10);
17
18     cout<<endl;
19     cout<<"Odd numbers"<<endl;
20     do
21     {
22         if (j%2 != 0)
23         {
24             cout<<j<<endl;
25         }
26         j++;
27     }
28     while (j<=10);
29
30 }
```



Output:

```
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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Loop\do while loop"
PS D:\oop_lab_assignment\Loop\do while loop> & .\"Q2.exe"
Even numbers
0
2
4
6
8
10

Odd numbers
1
3
5
7
9
PS D:\oop_lab_assignment\Loop\do while loop> █
```

3. Take a number from user and make a table of that number using do while loop.

Code:

```
Q3.cpp X
Loop > do while loop > Q3.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      int n , i=1;
6      cout<<"Enter the number: ";
7      cin>>n;
8      do
9      {
10         cout<<n<<" * "<<i<<" = "<<n*i<<endl;
11         i++;
12     }
13     while (i<=10);
14 }
15
```

Output:

```
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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Loop\do while loop"
PS D:\oop_lab_assignment\Loop\do while loop> & .\"Q3.exe"
Enter the number: 12
12 * 1 = 12
12 * 2 = 24
12 * 3 = 36
12 * 4 = 48
12 * 5 = 60
12 * 6 = 72
12 * 7 = 84
12 * 8 = 96
12 * 9 = 108
12 * 10 = 120
PS D:\oop_lab_assignment\Loop\do while loop> █
```

4. Take a number from user and find factorial of that number using do while loop.

Code:

```
Q4.cpp X
Loop > do while loop > Q4.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      int n, fac=1,i=1;
6      cout<<"Enter a number: ";
7      cin>>n;
8
9      do
10     {
11         fac*=i;
12         i++;
13     }
14     while (i<=n);
15     cout<<fac<<endl;
16     return 0;
17 }
```

Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Loop\do while loop"
PS D:\oop_lab_assignment\Loop\do while loop> & .\"Q4.exe"
Enter a number: 23
862453760
PS D:\oop_lab_assignment\Loop\do while loop> █
```

5. Make a calculator using if-else-if else statement which perform the addition, subtraction, multiplication, division and remainder operations. Take values and operator from user on runtime. Use do while loop for user choice. Means after performing one operation program will ask from user "do you want to do another calculation(yes/no)? ". If user press then user will enter number 1, number 2 and operator for calculation and if user press no then terminate the loop.

Code:

```

Q5.cpp  X
Loop > do while loop > Q5.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      float a,b;
6      char ch;
7      int choice;
8      do
9      {
10         cout<<"Enter first number: ";
11         cin>>a;
12         cout<<"Enter second nubmer: ";
13         cin>>b;
14         cout<<"What operation you want to perform?"<<endl;
15         cout<<"For Addition press + "<<endl;
16         cout<<"For Subtraction press - "<<endl;
17         cout<<"For Multiplication press * "<<endl;
18         cout<<"For Division press / "<<endl;
19         cin>>ch;
20
21         if (ch == '+')
22         {
23             cout<<"The addition of "<<a<<" and "<<b<<" is "<<a+b<<endl;
24         }
25         else if (ch == '-')
26         {
27             cout<<"The subtraction of "<<a<<" and "<<b<<" is "<<a-b<<endl;
28         }
29         else if (ch == '*')
30         {
31             cout<<"The multiplication of "<<a<<" and "<<b<<" is "<<a*b<<endl;
32         }
33         else if (ch == '/')
34         {
35             cout<<"The division of "<<a<<" and "<<b<<" is "<<a/b<<endl;
36         }

```

```

33     else if (ch == '/')
34     {
35         cout<<"The division of "<<a<<" and "<<b<<" is "<<a/b<<endl;
36     }
37     else
38     {
39         cout<<"Please enter the correct character."<<endl;
40     }
41     cout<<"Do you want to do another calculation?"<<endl<<"1.Yes"<<endl<<"2.No "<<endl;
42     cin>>choice;
43 }
44 while(choice != 2);
45 }

```

Output:

```

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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Loop\do while loop"
PS D:\oop_lab_assignment\Loop\do while loop> & .\"Q5.exe"
Enter first number: 12
Enter second nubmer: 32
What operation you want to perform?
For Addition press +
For Subtraction press -
For Multiplication press *
For Division press /
+
The addition of 12 and 32 is 44
Do you want to do another calculation?
1.Yes
2.No
2
PS D:\oop_lab_assignment\Loop\do while loop>

```

## Nested for loop

1. Code:

```
Q1.cpp ×
Loop > Nested for loop > Q1.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      int i,j;
6      for ( i = 0; i <=5; i++)
7      {
8          j=i;
9          while (j<=5)
10         {
11             cout<<"*";
12             j++;
13         }
14         cout<<endl;
15     }
16 }
```

Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Loop\Nested for loop"
PS D:\oop_lab_assignment\Loop\Nested for loop> & .\"Q1.exe"
*****
*****
*****
***
**
*
PS D:\oop_lab_assignment\Loop\Nested for loop> █
```

2. Code:

```
Q2.cpp X
Loop > Nested for loop > Q2.cpp > ...
1  #include<iostream>
2
3  using namespace std;
4
5
6  int main()
7  {
8      int i,j,n;
9      n=5;
10     for (i = 1; i <=5; i++)    //repetition of columns (i)
11     {
12         j=1;
13         while (j<=n)          //repetition of rows (j)
14         {
15             cout<<j;
16             j++;
17         }
18         cout<<endl;
19         --n;
20     }
21 }
22
```

Output:

```
TERMINAL  OUTPUT  PROBLEMS  DEBUG CONSOLE

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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Loop\Nested for loop"
PS D:\oop_lab_assignment\Loop\Nested for loop> & .\"Q2.exe"
12345
1234
123
12
1
PS D:\oop_lab_assignment\Loop\Nested for loop> █
```

## 3. Code:

```
Q3.cpp X
Loop > Nested for loop > Q3.cpp > ...
1  #include<iostream>
2  #include<iomanip>
3  using namespace std;
4
5
6  int main()
7  {
8      int i,j,k,c=5;
9
10     for (i = 1; i <=5; i++)    //repetition of columns (i)
11     {
12         for (k = 1; k <=c; k++)
13         {
14             cout<<" ";
15         }
16         for ( j = 1; j <= i; j++)
17         {
18             cout<<setw(2)<<"*";
19         }
20         cout<<endl;
21         c--;
22     }
23 }
24
```



Output:

```
TERMINAL  OUTPUT  PROBLEMS  DEBUG CONSOLE

Windows PowerShell
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Loop\Nested for loop"
PS D:\oop_lab_assignment\Loop\Nested for loop> & .\"Q3.exe"
    *
  * *
* * *
* * * *
* * * * *
PS D:\oop_lab_assignment\Loop\Nested for loop> █
```

## 4. Code:

```
Q4.cpp X
Loop > Nested for loop > Q4.cpp > ...
1  #include<iostream>
2  #include<iomanip>
3  using namespace std;
4
5
6  int main()
7  {
8      int i,j,k,c=5;
9
10     for (i = 5; i >=1; i--)
11     {
12         for (k = 1; k<=c; k++)
13         {
14             cout<<" ";
15         }
16         for ( j = 1; j <= i; j++)
17         {
18             cout<<setw(2)<<"x";
19         }
20         cout<<endl;
21         c++;
22     }
23 }
24
```

Output:

```
TERMINAL  OUTPUT  PROBLEMS  DEBUG CONSOLE

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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Loop\Nested for loop"
PS D:\oop_lab_assignment\Loop\Nested for loop> & .\"Q4.exe"
    x x x x x
    x x x x
    x x x
    x x
    x
PS D:\oop_lab_assignment\Loop\Nested for loop> |
```

## Arrays

### 1D Arrays

1. Write a C++ program that will add two single dimensional array elements. Take values from user at runtime.

Code:

```
Q1.cpp ×
Arrays > 1D Arrays > Q1.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      int sum=0;
6      int arr_1[5];
7      int arr_2[5];
8
9      for(int i =0 ; i<5; i++)
10     {
11         cout<<"array_1["<<i<<" = ";
12         cin>>arr_1[i];
13     }
14     cout<<endl;
15
16     for(int j =0 ; j<5; j++)
17     {
18         cout<<"array_2["<<j<<" = ";
19         cin>>arr_2[j];
20     }
21
22     for(int k =0 ; k<5; k++)
23     {
24         sum= arr_1[k]+arr_2[k];
25         cout<<sum<<"\t";
26     }
27     cout<<endl;
28
29 }
30
```

Output:

```
TERMINAL  OUTPUT  PROBLEMS  DEBUG CONSOLE

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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Arrays\1D Arrays"
PS D:\oop_lab_assignment\Arrays\1D Arrays> & .\"Q1.exe"
array_1[0] = 1
array_1[1] = 2
array_1[2] = 3
array_1[3] = 4
array_1[4] = 5

array_2[0] = 6
array_2[1] = 7
array_2[2] = 8
array_2[3] = 9
array_2[4] = 0
7      9      11      13      5
PS D:\oop_lab_assignment\Arrays\1D Arrays> |
```

2. How to generate random number in C++, write a simple C++ program that will generate random number from 1 to 100?

Code:

```
Q2.cpp X
Arrays > 1D Arrays > Q2.cpp > ...
1  #include<iostream>
2  #include<cctype>
3  #include<cstdlib>
4  #include<ctime>
5
6  using namespace std;
7
8  int main()
9  {
10     int ran;
11     srand(time(0));
12     ran = rand();
13     ran = ran % 99 + 1;
14     cout<<ran<<endl;
15 }
16
```

Output:

```
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Windows PowerShell
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Arrays\1D Arrays"
PS D:\oop_lab_assignment\Arrays\1D Arrays> & .\"Q2.exe"
64
PS D:\oop_lab_assignment\Arrays\1D Arrays> █
```

3. Write a C++ program that will add two single dimensional arrays elements using random numbers?

Code:

```
Q3.cpp X
Arrays > 1D Arrays > Q3.cpp > main()
1  #include<iostream>
2  #include<cctype>
3  #include<cstdlib>
4  #include<ctime>
5  using namespace std;
6  int main()
7  {
8      int ran;
9      int sum=0;
10     int arr_1[5];
11     int arr_2[5];
12     srand(time(0));
13     for(int i =0 ; i<5; i++)
14     {
15         ran = rand();
16         ran = ran % 99 + 1;
17         arr_1[i] = ran;
18     }
19     cout<<endl;
20     for(int j =0 ; j<5; j++)
21     {
22         ran = rand();
23         ran = ran % 99 + 1;
24         arr_2[j] = ran;
25     }
26     for(int a =0 ; a<5; a++)
27     {
28         cout<<"array_1["<<a<<" ] = "<<arr_1[a]<<endl;
29     }
30     cout<<endl;
31     for(int b =0 ; b<5; b++)
32     {
33         cout<<"array_2["<<b<<" ] = "<<arr_2[b]<<endl;
34     }
```

```

31     for(int b =0 ; b<5; b++)
32     {
33         cout<<"array_2["<<b<<" ] = "<<arr_2[b]<<endl;
34     }
35     for(int k =0 ; k<5; k++)
36     {
37         sum= arr_1[k]+arr_2[k];
38         cout<<"Sum of element "<<arr_1[k]<<" and "<<arr_2[k]<<" is: "<<sum<<endl;
39     }
40     cout<<endl;
41 }
42

```

Output:

```

TERMINAL  OUTPUT  PROBLEMS  DEBUG CONSOLE

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Arrays\1D Arrays"
PS D:\oop_lab_assignment\Arrays\1D Arrays> & .\"Q3.exe"

array_1[0] = 91
array_1[1] = 92
array_1[2] = 49
array_1[3] = 81
array_1[4] = 69

array_2[0] = 43
array_2[1] = 4
array_2[2] = 59
array_2[3] = 2
array_2[4] = 23
Sum of element 91 and 43 is: 134
Sum of element 92 and 4 is: 96
Sum of element 49 and 59 is: 108
Sum of element 81 and 2 is: 83
Sum of element 69 and 23 is: 92

PS D:\oop_lab_assignment\Arrays\1D Arrays>

```

4. Write a C++ program that will find maximum number in an array?

Code:



```
Q4.cpp X
Arrays > 1D Arrays > Q4.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      int arr[5];
6
7      for(int i =0 ; i<5; i++)
8      {
9          cout<<"array["<<i<<" ] = ";
10         cin>>arr[i];
11     }
12     cout<<endl;
13
14     int max=arr[0];
15
16     for(int j =0 ; j<5; j++)
17     {
18         if (arr[j]>max)
19         {
20             max=arr[j];
21         }
22     }
23     cout<<endl;
24     cout<<"Maximum Number is = "<<max<<endl;
25 }
26
```

Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Arrays\1D Arrays"
PS D:\oop_lab_assignment\Arrays\1D Arrays> & .\"Q4.exe"
array[0] = 1
array[1] = 2
array[2] = 3
array[3] = 4
array[4] = 5

Maximum Number is = 5
PS D:\oop_lab_assignment\Arrays\1D Arrays> █
```

5. Write a C++ program that will find minimum number in an array?

Code:

```
Q5.cpp X
Arrays > 1D Arrays > Q5.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      int i,j;
6      int arr[5];
7
8      for(i =0 ; i<5; i++)
9      {
10         cout<<"array["<<i<<" ] = ";
11         cin>>arr[i];
12     }
13     cout<<endl;
14
15     int min=arr[0];
16
17     for(j =0 ; j<5; j++)
18     {
19         if (arr[j]<min)
20         {
21             min=arr[j];
22         }
23     }
24     cout<<endl;
25     cout<<"Minimum Number is = "<<min<<endl;
26 }
27
```

Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Arrays\1D Arrays"
PS D:\oop_lab_assignment\Arrays\1D Arrays> & .\"Q5.exe"
array[0] = 1
array[1] = 2
array[2] = 3
array[3] = 4
array[4] = 5

Minimum Number is = 1
PS D:\oop_lab_assignment\Arrays\1D Arrays> |
```

## 2D Arrays

1. Write a C++ program that will create 2D array using random numbers and then show these values.

Code:

```
Q1.cpp X
Arrays > 2D Arrays > Q1.cpp > ...
1  #include<iostream>
2  #include<cctype>
3  #include<cstdlib>
4  #include<ctime>
5  using namespace std;
6  int main()
7  {
8      int arr[3][3],ran;
9      srand(time(0));
10
11     for (int r = 0; r < 3; r++)
12     {
13         for (int c = 0; c < 3; c++)
14         {
15             ran = rand();
16             ran = ran % 99 + 1;
17             arr[r][c] = ran;
18         }
19     }
20
21     cout<<endl<<"Values of Array"<<endl<<endl;
22     for (int r = 0; r < 3; r++)
23     {
24         for (int c = 0; c < 3; c++)
25         {
26             cout<<arr[r][c]<<"\t";
27         }
28         cout<<endl;
29     }
30 }
31
32
33
```

Output:

```
TERMINAL  OUTPUT  PROBLEMS  DEBUG CONSOLE

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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Arrays\2D Arrays"
PS D:\oop_lab_assignment\Arrays\2D Arrays> & .\"Q1.exe"

Values of Array

13      77      8
2       56     57
58      1      23
PS D:\oop_lab_assignment\Arrays\2D Arrays> |
```

2. Write a C++ program that will find maximum and minimum number in 2D array. Note array elements must be random values.

Code:

```
Q2.cpp X
Arrays > 2D Arrays > Q2.cpp > main()
1  #include<iostream>
2  #include<cctype>
3  #include<cstdlib>
4  #include<ctime>
5  using namespace std;
6  int main()
7  {
8      int arr[3][3],ran;
9      srand(time(0));
10     for (int r = 0; r < 3; r++)
11     {
12         for (int c = 0; c < 3; c++)
13         {
14             ran = rand();
15             ran = ran % 99 + 1;
16             arr[r][c] = ran;
17         }
18     }
19     int max=arr[0][0] , min=arr[0][0];
20     cout<<endl<<"Array values are: "<<endl<<endl;
21     for (int r = 0; r < 3; r++)
22     {
23         for (int c = 0; c < 3; c++)
24         {
25             cout<<arr[r][c]<<"\t";
26             if (arr[r][c]>max)
27             {
28                 max=arr[r][c];
29             }
30         }
31     }
32     cout<<endl;
33 }
```

```

34     for (int r = 0; r < 3; r++)
35     {
36         for (int c = 0; c < 3; c++)
37         {
38             if (min>arr[r][c])
39             {
40                 min=arr[r][c];
41             }
42         }
43     }
44     cout<<endl;
45 }
46 cout<<"Maximum Number is = "<<max<<endl;
47 cout<<"Minimum Number is = "<<min<<endl;
48 }

```

Output:

```

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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Arrays\2D Arrays"
PS D:\oop_lab_assignment\Arrays\2D Arrays> & .\"Q2.exe"

Array values are:

40      32      23
93      73      47
93      72      66

Maximum Number is = 93
Minimum Number is = 23
PS D:\oop_lab_assignment\Arrays\2D Arrays>

```

- Write a C++ program that will add two 2D arrays elements. Take values from user at runtime. Note display values of 1st, 2nd and their resultant array. Hints: A will be the 1st array, B will be the 2nd array and C will be resultant array. Note: Follow Mathematics Matrix Addition Rules

Code:



```
Q3.cpp X
Arrays > 2D Arrays > Q3.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      int arr_a[3][3];
6      int arr_b[3][3];
7      int sum;
8      cout<<"Enter values for array initialization"<<endl;
9      for (int r = 0; r < 3; r++)
10     {
11         for (int c = 0; c < 3; c++)
12         {
13             cout<<"a["<<r<<"]"<<"["<<c<<"] = ";
14             cin>>arr_a[r][c];
15             cout<<"b["<<r<<"]"<<"["<<c<<"] = ";
16             cin>>arr_b[r][c];
17         }
18     }
19     cout<<endl<<"Values of Array a"<<endl<<endl;
20     for (int r = 0; r < 3; r++)
21     {
22         for (int c = 0; c < 3; c++)
23         {
24             cout<<arr_a[r][c]<<"\t";
25         }
26         cout<<endl;
27     }
28     cout<<endl<<"Values of Array b"<<endl<<endl;
```

```
30     cout<<endl<<"Values of Array b"<<endl<<endl;
31     for (int r = 0; r < 3; r++)
32     {
33         for (int c = 0; c < 3; c++)
34         {
35             cout<<arr_b[r][c]<<"\t";
36         }
37         cout<<endl;
38     }
39     cout<<endl<<"Values of Array c (Resultant array) after addition of Array a and b "<<endl<<endl;
40     for (int r = 0; r < 3; r++)
41     {
42         for (int c = 0; c < 3; c++)
43         {
44             sum=arr_a[r][c]+arr_b[r][c];
45             cout<<"Sum of element "<<arr_a[r][c]<<" and "<<arr_b[r][c]<<" is: "<<sum<<endl;
46         }
47         cout<<endl;
48     }
49 }
50
51
52
```

Output:

```
TERMINAL    OUTPUT    PROBLEMS    DEBUG CONSOLE

PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Arrays\2D Arrays"
PS D:\oop_lab_assignment\Arrays\2D Arrays> & .\Q3.exe
Enter values for array initialization
a[0][0] = 1
b[0][0] = 2
a[0][1] = 3
b[0][1] = 4
a[0][2] = 5
b[0][2] = 6
a[1][0] = 7
b[1][0] = 8
a[1][1] = 9
b[1][1] = 0
a[1][2] = 1
b[1][2] = 2
a[2][0] = 3
b[2][0] = 4
a[2][1] = 5
b[2][1] = 6
a[2][2] = 7
b[2][2] = 8

Values of Array a

1      3      5
7      9      1
3      5      7

Values of Array b

2      4      6
8      0      2
4      6      8

Values of Array c (Resultant array) after addition of Array a and b

Sum of element 1 and 2 is: 3
Sum of element 3 and 4 is: 7
Sum of element 5 and 6 is: 11

Sum of element 7 and 8 is: 15
Sum of element 9 and 0 is: 9
Sum of element 1 and 2 is: 3
```

Values of Array c (Resultant array) after addition of Array a and b

Sum of element 1 and 2 is: 3  
Sum of element 3 and 4 is: 7  
Sum of element 5 and 6 is: 11

Sum of element 7 and 8 is: 15  
Sum of element 9 and 0 is: 9  
Sum of element 1 and 2 is: 3

Sum of element 3 and 4 is: 7  
Sum of element 5 and 6 is: 11  
Sum of element 7 and 8 is: 15

PS D:\oop\_lab\_assignment\Arrays\2D Arrays> █

4. Write a C++ program that will multiply two 2D arrays elements. Take values from user at runtime. Note display values of 1st, 2nd and their resultant array. Hints: A will be the 1st array, B will be the 2nd array and C will be resultant array. Note: Follow Mathematics Matrix Multiplication Rules

Code:

```
Q4.cpp X
Arrays > 2D Arrays > Q4.cpp > ...
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      int arr_a[3][3];
6      int arr_b[3][3];
7      int product=0;
8      cout<<"Enter values for array initialization"<<endl;
9      for (int r = 0; r < 3; r++)
10     {
11         for (int c = 0; c < 3; c++)
12         {
13             cout<<"a["<<r<<"]"<<"["<<c<<"] = ";
14             cin>>arr_a[r][c];
15             cout<<"b["<<r<<"]"<<"["<<c<<"] = ";
16             cin>>arr_b[r][c];
17         }
18     }
19     cout<<endl<<"Values of Array a"<<endl<<endl;
20     for (int r = 0; r < 3; r++)
21     {
22         for (int c = 0; c < 3; c++)
23         {
24             cout<<arr_a[r][c]<<"\t";
25         }
26         cout<<endl;
27     }
28     cout<<endl<<"Values of Array b"<<endl<<endl;
29
30
```

```
30     cout<<endl<<"Values of Array b"<<endl<<endl;
31     for (int r = 0; r < 3; r++)
32     {
33         for (int c = 0; c < 3; c++)
34         {
35             cout<<arr_b[r][c]<<"\t";
36         }
37         cout<<endl;
38     }
39     cout<<endl<<"Values of Array c (Resultant array) after addition of Array a and b "<<endl<<endl;
40     for (int r = 0; r < 3; r++)
41     {
42         for (int c = 0; c < 3; c++)
43         {
44             product=arr_a[r][c]*arr_b[r][c];
45             cout<<"Product of element "<<arr_a[r][c]<<" and "<<arr_b[r][c]<<" is: "<<product<<endl;
46         }
47         cout<<endl;
48     }
49 }
50
51
52
```

Output:

```
TERMINAL  OUTPUT  PROBLEMS  DEBUG CONSOLE

PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Arrays\2D Arrays"
PS D:\oop_lab_assignment\Arrays\2D Arrays> & .\"Q4.exe"
Enter values for array initialization
a[0][0] = 1
b[0][0] = 2
a[0][1] = 3
b[0][1] = 4
a[0][2] = 5
b[0][2] = 6
a[1][0] = 7
b[1][0] = 8
a[1][1] = 9
b[1][1] = 0
a[1][2] = 1
b[1][2] = 2
a[2][0] = 3
b[2][0] = 4
a[2][1] = 5
b[2][1] = 6
a[2][2] = 7
b[2][2] = 8

Values of Array a

1      3      5
7      9      1
3      5      7

Values of Array b

2      4      6
8      0      2
4      6      8

Values of Array c (Resultant array) after addition of Array a and b

Product of element 1 and 2 is: 2
Product of element 3 and 4 is: 12
Product of element 5 and 6 is: 30

Product of element 7 and 8 is: 56
Product of element 9 and 0 is: 0
Product of element 1 and 2 is: 2
```

Values of Array c (Resultant array) after addition of Array a and b

Product of element 1 and 2 is: 2  
Product of element 3 and 4 is: 12  
Product of element 5 and 6 is: 30

Product of element 7 and 8 is: 56  
Product of element 9 and 0 is: 0  
Product of element 1 and 2 is: 2

Product of element 3 and 4 is: 12  
Product of element 5 and 6 is: 30  
Product of element 7 and 8 is: 56

PS D:\oop\_lab\_assignment\Arrays\2D Arrays> █

## Functions

1. Write function in C++ that will calculate table of a number in C++. Number must be passed from calling function as an argument to function parameters.

Code:



```
Q1.cpp X
Functions > Q1.cpp > ...
1  #include<iostream>
2  using namespace std;
3  void table(int num);
4  int main()
5  {
6      int n;
7      cout<<"Enter the number: ";
8      cin>>n;
9      table(n);
10     return 0;
11 }
12
13
14 void table(int num)
15 {
16     for (int i = 1; i <= 10; i++)
17     {
18         cout<<num<<" * "<<i<<" = "<<num*i<<endl;
19     }
20 }
21 }
```

Output:

```
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Windows PowerShell
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Functions"
PS D:\oop_lab_assignment\Functions> & .\"Q1.exe"
Enter the number: 43
43 * 1 = 43
43 * 2 = 86
43 * 3 = 129
43 * 4 = 172
43 * 5 = 215
43 * 6 = 258
43 * 7 = 301
43 * 8 = 344
43 * 9 = 387
43 * 10 = 430
PS D:\oop_lab_assignment\Functions> █
```

2. Write function in C++ that will find factorial of a number. Number must be passed from calling function as an argument to function parameters.

Code:

```
Q2.cpp X
Functions > Q2.cpp > ...
1  #include<iostream>
2  using namespace std;
3
4  int fac(int num);
5
6  int main()
7  {
8      int n;
9      cout<<"Enter the number: ";
10     cin>>n;
11     cout<<fac(n)<<endl;
12     return 0;
13
14 }
15
16 int fac(int num)
17 {
18     int fac=1;
19     for (int i = 1; i <= num; i++)
20     {
21         fac*=i;
22     }
23     return fac;
24 }
```

Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Functions"
PS D:\oop_lab_assignment\Functions> & .\"Q2.exe"
Enter the number: 5
120
PS D:\oop_lab_assignment\Functions> |
```

3. Update your calculator using functions (Calculator you implemented in do while loop section question no. 05. Create separate functions for addition, subtraction, division, multiplication and remainder operations).

Code:

```
Q3.cpp X
Functions > Q3.cpp > main()
1  #include<iostream>
2
3  using namespace std;
4
5  void addition(float a,float b);
6  void subtraction(float a,float b);
7  void multiplication(float a,float b);
8  void division(float a,float b);
9  void remainder(int a,int b);
10
11 int main()
12 {
13     float a,b;
14     char ch;
15     char choice;
16     do
17     {
18         cout<<"Enter first number: ";
19         cin>>a;
20         cout<<"Enter second nubmer: ";
21         cin>>b;
22         cout<<"What operation you want to perform?"<<endl;
23         cout<<"For Addition press + "<<endl;
24         cout<<"For Subtraction press - "<<endl;
25         cout<<"For Multiplication press * "<<endl;
26         cout<<"For Division press / "<<endl;
27         cout<<"For Remainder press % "<<endl;
28         cin>>ch;
29
30         switch (ch)
31         {
32             case '+':
33                 addition(a,b);
34                 break;
35             case '-':
36                 subtraction(a,b);
37                 break;
```

```
35         case '-':
36             subtraction(a,b);
37             break;
38         case '*':
39             multiplication(a,b);
40             break;
41         case '/':
42             division(a,b);
43             break;
44         case '%':
45             remainder(a,b);
46             break;
47         default:
48             cout<<"Please enter the correct character."<<endl;
49             break;
50     }
51     cout<<"Do you want to do another calculation?(y/n)"<<endl;
52     cin>>choice;
53 }
54 while(choice != 'n');
55 }
56
57 void addition(float a,float b)
58 {
59     cout<<"The addition of "<<a<<" and "<<b<<" is "<<a+b<<endl;
60 }
61
62 void subtraction(float a,float b)
63 {
64     cout<<"The subtraction of "<<a<<" and "<<b<<" is "<<a-b<<endl;
65 }
66
```

```
62 void subtraction(float a,float b)
63 {
64     cout<<"The subtraction of "<<a<<" and "<<b<<" is "<<a-b<<endl;
65 }
66
67 void multiplication(float a,float b)
68 {
69     cout<<"The multiplication of "<<a<<" and "<<b<<" is "<<a*b<<endl;
70 }
71
72 void division(float a,float b)
73 {
74     cout<<"The division of "<<a<<" and "<<b<<" is "<<a/b<<endl;
75 }
76
77 void remainder(int a,int b)
78 {
79     cout<<"The remainder of "<<a<<" and "<<b<<" is "<<a%b<<endl;
80 }
81
```

Output:

```

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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Functions"
PS D:\oop_lab_assignment\Functions> & .\"Q3.exe"
Enter first number: 12
Enter second nubmer: 12
What operation you want to perform?
For Addition press +
For Subtraction press -
For Multiplication press *
For Division press /
For Remainder press %
%
The remainder of 12 and 12 is 0
Do you want to do another calculation?(y/n)
y
Enter first number: 12
Enter second nubmer: 12
What operation you want to perform?
For Addition press +
For Subtraction press -
For Multiplication press *
For Division press /
For Remainder press %
-
The subtraction of 12 and 12 is 0
Do you want to do another calculation?(y/n)
n
PS D:\oop_lab_assignment\Functions> █

```

4. Write user defined function arrayFunction() in C++ which will initialize array by taking values from user at run time and then call this function in main function which will return this array from the calling function to the called function (to the main function) and then show all items of this array in main function using loop.

Code:

```
Q4.cpp ×
Functions > Q4.cpp > ...
1  #include<iostream>
2
3  using namespace std;
4
5  int *arrayFunction()
6  {
7      static int a[5];
8      cout<<"Enter the Elements "<<endl;
9      for (int i = 0; i < 5; i++)
10     {
11         cout << "a["<<i<<"]"<<" : ";
12         cin>>a[i];
13     }
14     return a;
15 }
16
17 int main()
18 {
19     int *p;
20     p = arrayFunction();
21     cout<<endl<<"-----"<<endl;
22     for ( int i = 0; i < 5; i++ )
23     {
24         cout << "a["<<i<<"]"<<" : ";
25         cout << *(p + i) << endl;
26     }
27     return 0;
28 }
```



Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Functions"
PS D:\oop_lab_assignment\Functions> & .\"Q4.exe"
Enter the Elements
a[0] : 1
a[1] : 2
a[2] : 3
a[3] : 4
a[4] : 5

-----
a[0] : 1
a[1] : 2
a[2] : 3
a[3] : 4
a[4] : 5
PS D:\oop_lab_assignment\Functions> |
```

5. Write a program that check the type of the value and determine the data type of the value. In this program, you will develop a Type checking program (Type Checker).  
If the argument of printType (true) is true or false, it will invoke a function inside and print a message "true is a boolean". If it is int 463287462 then it should display "4632874 is Integer". The sample output format is as follows: 1.24353 is double data type 334345345 is an integer data type 1 is boolean data type A is a character data type

Code:

```
Q5.cpp X
Functions > Q5.cpp > ...
1  #include<iostream>
2
3  using namespace std;
4
5  int printType(double x);
6  int printType(int x);
7  int printType(bool x);
8  int printType(char x);
9
10 int main()
11 {
12     printType(23);
13     return 0;
14 }
15
16 int printType(double x)
17 {
18     cout<<x<<" is double data type."<<endl;
19 }
20 int printType(int x)
21 {
22     cout<<x<<" is an integer data type."<<endl;
23 }
24 int printType(bool x)
25 {
26     cout<<x<<" is boolean data type."<<endl;
27 }
28 int printType(char x)
29 {
30     cout<<x<<" is a character data type."<<endl;
31 }
32
```

Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Functions"
PS D:\oop_lab_assignment\Functions> & .\"Q5.exe"
23 is an integer data type.
PS D:\oop_lab_assignment\Functions> █
```

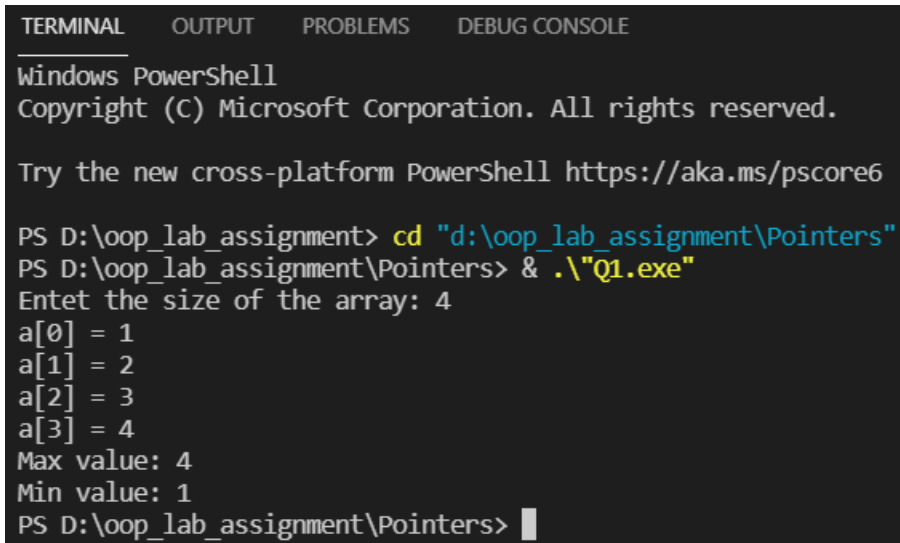
## Pointers

1. Write a program to input data into an array (Take value from user at runtime for inserting into array using loop) and find out the maximum value and minimum value from array through pointer?

Code:

```
Q1.cpp X
Pointers > Q1.cpp > ...
1  #include<iostream>
2  using namespace std;
3  void max_min(int a[],int size);
4
5  int main()
6  {
7      int size_of_array;
8      int a[100];
9      cout<<"Enter the size of the array: ";
10     cin>>size_of_array;
11     max_min(a,size_of_array);
12 }
13 void max_min(int a[],int size)
14 {
15     int *p;
16
17     for(int i=0; i<size;i++)
18     {
19         cout << "a["<< i<<"] = ";
20         cin>>a[i];
21     }
22     int max=a[0], min=a[0];
23     for (int i = 0; i < size; i++)
24     {
25         p=&a[i];
26         if ( *p > max)
27         {
28             max=*p;
29         }
30         if ( *p < min)
31         {
32             min=*p;
33         }
34     }
35     cout<<"Max value: "<<max<<endl;
36     cout<<"Min value: "<<min<<endl;
37 }
```

Output:



```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Pointers"
PS D:\oop_lab_assignment\Pointers> & .\Q1.exe
Entet the size of the array: 4
a[0] = 1
a[1] = 2
a[2] = 3
a[3] = 4
Max value: 4
Min value: 1
PS D:\oop_lab_assignment\Pointers> |
```

2. Write a program to convert Fahrenheit to Celsius degrees by passing pointers as arguments to the function? (Take value from user at runtime)

Code:

```

Q2.cpp X
Pointers > Q2.cpp > ...
1  #include<iostream>
2  using namespace std;
3  void conversion(float c);
4
5  int main()
6  {
7      float temp;
8      cout<<"Enter the Temperature in Fahrenheit: ";
9      cin>>temp;
10     float *p = &temp;
11     conversion( *p );
12 }
13
14 void conversion(float f)
15 {
16     float c;
17     c = (f-32) * 5.0/9.0 ;
18     cout<<"Temperature in Celsius is: "<<c<<endl;
19 }

```

Output:

```

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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Pointers"
PS D:\oop_lab_assignment\Pointers> & .\"Q2.exe"
Enter the Temperature in Fahrenheit: 34
Temperature in Celsius is: 1.1111
PS D:\oop_lab_assignment\Pointers>

```

3. Write a program to convert kilogram into grams by passing pointers as arguments to the function? (Take values from user at runtime)

Code:

```
Q3.cpp X
Pointers > Q3.cpp > ...
1  #include<iostream>
2  using namespace std;
3  void mass(float g);
4
5  int main()
6  {
7      float m;
8      cout<<"Enter the amount in Kilograms: ";
9      cin>>m;
10     float *p = &m;
11     mass(*p);
12 }
13
14 void mass(float g)
15 {
16     float kg;
17     kg= g*1000;
18     cout<<"Entered amount in grams: "<<kg<<"g"<<endl;
19 }
20
```

Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Pointers"
PS D:\oop_lab_assignment\Pointers> & .\"Q3.exe"
Enter the amount in Kilograms: 23
Entered amount in grams: 23000g
PS D:\oop_lab_assignment\Pointers> █
```

4. Write a program to find out the length of string by using pointers? (Take string value from user at runtime)

Code:

```
Q4.cpp X
Pointers > Q4.cpp > ...
1  #include<iostream>
2  using namespace std;
3  void length(char *);
4
5  int main()
6  {
7      char str[100];
8      cout << "Enter a string: ";
9      cin.get(str,100);
10     length( str );
11
12 }
13
14 void length(char *a)
15 {
16     int count = 0;
17     while ( *a!='\0')
18     {
19         count++;
20         *a++;
21     }
22
23     cout<<"Length of the string is "<<count<<endl;
24 }
```

Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Pointers"
PS D:\oop_lab_assignment\Pointers> & .\Q4.exe
Enter a string: Saad Ahmad
Length of the string is 10
PS D:\oop_lab_assignment\Pointers> █
```



5. Write a program to copy one string to another string by using pointers? (Take string value from user at runtime)

Code:

```
Q5.cpp X
Pointers > Q5.cpp > ...
1  #include<iostream>
2  using namespace std;
3  void copy(char *);
4
5  int main()
6  {
7      char str1[100];
8      cout << "Enter a string: ";
9      cin.getline(str1,100);
10     cout<<"The value of String 1 "<<str1<<endl;
11     copy( str1 );
12 }
13 void copy(char *a)
14 {
15     char str2[100];
16     int i=0;
17     while ( *a!='\0')
18     {
19         str2[i] = *a;
20         *a++;
21         i++;
22     }
23     str2[i]= '\0';
24     cout<<"The value of String 2 "<<str2<<endl;
25 }
```

Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Pointers"
PS D:\oop_lab_assignment\Pointers> & .\"Q5.exe"
Enter a string: Saad Ahmad
The value of String 1 Saad Ahmad
The value of String 2 Saad Ahmad
PS D:\oop_lab_assignment\Pointers> █
```

6. Write a program to combine two strings by using pointers? (Take both strings value from user at runtime)

Code:

```
Q6.cpp X
Pointers > Q6.cpp > ...
1  #include<iostream>
2  using namespace std;
3  void combine(char *, char *);
4
5  int main()
6  {
7      char str1[100];
8      char str2[100];
9      char str3[100];
10
11     cout << "Enter a string 1: ";
12     cin.getline(str1,100);
13
14     cout << "Enter a string 2: ";
15     cin.getline(str2,100);
16     combine( str1, str2 );
17 }
18 void combine(char *a , char *b)
19 {
20     char str3[100];
21     int i=0,j=0;
22     while ( *a!='\0')
23     {
24         str3[i] = *a;
25         *a++;
26         i++;
27     }
28     str3[i++];
29     while (*b!='\0')
30     {
31         str3[i] = *b;
32         *b++;
33         i++;
34     }
35     str3[i]='\0';
36     cout<<str3<<endl;
37 }
```

Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Pointers"
PS D:\oop_lab_assignment\Pointers> & .\Q6.exe
Enter a string 1: Saad
Enter a string 2: Ahmad
Saad
Ahmad
PS D:\oop_lab_assignment\Pointers> █
```

## Structures

1. Create a structure called employee that contains two members: an employee number (type int) and the employee's compensation (in dollars; type float). Ask the user to fill in this data for three employees, store it in three variables of type struct employee, and then display the information for each employee.

Code:

```

Q1.cpp  X
Structures > Q1.cpp > ...
1  #include<iostream>
2  using namespace std;
3
4  struct employee
5  {
6      int employee_number;
7      float employee_compensation;
8  };
9
10 int main()
11 {
12     employee e1,e2,e3;
13     cout<<"Enter Number for Employee #1 "<<endl;
14     cin>>e1.employee_number;
15     cout<<"Enter Compensation in dollars for Employee #1 "<<endl;
16     cin>>e1.employee_compensation;
17     cout<<"Enter Number for Employee #2 "<<endl;
18     cin>>e2.employee_number;
19     cout<<"Enter Compensation in dollars for Employee #2 "<<endl;
20     cin>>e2.employee_compensation;
21     cout<<"Enter Number for Employee #3 "<<endl;
22     cin>>e3.employee_number;
23     cout<<"Enter Compensation in dollars for Employee #3 "<<endl;
24     cin>>e3.employee_compensation;
25
26     cout<<"-----"<<endl;
27     cout<<"First Employee's number is: "<<e1.employee_number<<"\n";
28     cout<<"And its Compensation is: "<<e1.employee_compensation<<endl;
29     cout<<"-----"<<endl;
30     cout<<"Second Employee's number is: "<<e2.employee_number<<"\n";
31     cout<<"And its Compensation is: "<<e2.employee_compensation<<endl;
32     cout<<"-----"<<endl;
33     cout<<"Third Employee's number is: "<<e3.employee_number<<"\n";
34     cout<<"And its Compensation is: "<<e3.employee_compensation<<endl;
35     cout<<"-----"<<endl;
36 }

```

Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Structures"
PS D:\oop_lab_assignment\Structures> & .\"Q1.exe"
Enter Number for Employee #1
12
Enter Compensation in dollars for Employee #1
45
Enter Number for Employee #2
24
Enter Compensation in dollars for Employee #2
60
Enter Number for Employee #3
34
Enter Compensation in dollars for Employee #3
56
-----
First Employee's number is: 12
And its Compensation is: 45
-----
Second Employee's number is: 24
And its Compensation is: 60
-----
Third Employee's number is: 34
And its Compensation is: 56
-----
PS D:\oop_lab_assignment\Structures> █
```

2. Create a structure called time. Its three members, all type int, should be called hours, minutes, and seconds. Write a program that prompts the user to enter a time value in hours, minutes, and seconds. The program should then store the time in a variable of type struct time, and finally print out the total number of seconds.

Code:

```
Q2.cpp  X
Structures > Q2.cpp > ...
1  #include<iostream>
2  using namespace std;
3
4  struct time1
5  {
6      int hours;
7      int minutes;
8      int seconds;
9      int hours_in_seconds;
10     int minutes_in_seconds;
11     int t_seconds;
12
13 };
14
15
16 int main()
17 {
18     time1 h,m,s;
19
20     cout<<"Enter hours: "<<endl;
21     cin>>h.hours;
22     cout<<"Enter minutes: "<<endl;
23     cin>>m.minutes;
24     cout<<"Enter seconds: "<<endl;
25     cin>>s.seconds;
26
27     h.hours_in_seconds= h.hours*3600;
28     m.minutes_in_seconds = m.minutes*60;
29     s.t_seconds = h.hours_in_seconds + m.minutes_in_seconds + s.seconds;
30
31     cout<<"Total number of seconds are: "<<s.t_seconds<<"s"<<endl;
32
33 }
```

Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Structures"
PS D:\oop_lab_assignment\Structures> & .\"Q2.exe"
Enter hours:
12
Enter minutes:
45
Enter seconds:
5
Total number of seconds are: 45905s
PS D:\oop_lab_assignment\Structures> █
```

3. Use the time structure from above question and write a program that obtains two time values from the user, stores them in struct time variables, converts each one to seconds (type int), adds these quantities, converts the result back to hours-minutes- seconds, stores the result in a time structure, and finally displays the result in 12:59:59 format

Code:



Q3.cpp X

Structures &gt; Q3.cpp &gt; ...

```
1  #include<iostream>
2  using namespace std;
3  struct time1
4  {
5      int hours;
6      int minutes;
7      int sec;
8      int hours_s;
9      int minutes_s;
10     int t_sec;
11 };
12 int main()
13 {
14     time1 t1,t2,t3;
15     cout<<"-----"<<endl;
16     cout<<"Enter hours of first time: ";
17     cin>>t1.hours;
18     cout<<"Enter minutes of first time: ";
19     cin>>t1.minutes;
20     cout<<"Enter seconds of first time: ";
21     cin>>t1.sec;
22     cout<<"-----"<<endl;
23     cout<<"Enter hours of second time: ";
24     cin>>t2.hours;
25     cout<<"Enter minutes of second time: ";
26     cin>>t2.minutes;
27     cout<<"Enter seconds of second time: ";
28     cin>>t2.sec;
29     t1.hours_s= t1.hours*3600;
30     t1.minutes_s = t1.minutes*60;
31     t1.t_sec = t1.hours_s + t1.minutes_s + t1.sec;
32     t2.hours_s= t2.hours*3600;
33     t2.minutes_s = t2.minutes*60;
34     t2.t_sec = t2.hours_s + t2.minutes_s + t2.sec;
35     t3.t_sec = t1.t_sec + t2.t_sec;
36     t3.minutes = t3.t_sec/60;
37     t3.hours = t3.minutes/60;
```

```

33     t2.minutes_s = t2.minutes*60;
34     t2.t_sec = t2.hours_s + t2.minutes_s + t2.sec;
35     t3.t_sec = t1.t_sec + t2.t_sec;
36     t3.minutes = t3.t_sec/60;
37     t3.hours = t3.minutes/60;
38     cout<< int(t3.hours)<<"h:"<<int(t3.minutes%60) <<"m:"<<int(t3.t_sec%60)<<"s"<<endl;
39     cout<<"-----"<<endl;
40 }
41

```

Output:

```

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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Structures"
PS D:\oop_lab_assignment\Structures> & .\"Q3.exe"
-----
Enter hours of first time: 12
Enter minutes of first time: 0
Enter seconds of first time: 0
-----
Enter hours of second time: 12
Enter minutes of second time: 0
Enter seconds of second time: 0
24h:0m:0s
-----
PS D:\oop_lab_assignment\Structures>

```

4. Create a structure called Volume that uses three variables of type Distance to model the volume of a room. Initialize a variable of type Volume to specific dimensions, then calculate the volume it represents, and print out the result. To calculate the volume, convert each dimension from a Distance variable to a variable of type float representing feet and fractions of a foot, and then multiply the resulting three numbers.

**Answer: This question is skipped on Instructor's desire.**

5. A phone number, such as (212) 767-8900, can be thought of as having three parts: the area code (212), the exchange (767), and the number (8900). Write a program that uses a structure to store these three parts of a phone number separately. Call the structure phone. Create two structure variables of type phone. Initialize one, and have the user input a number for the other one. Then display both numbers.

Code:

```
Q5.cpp x
Structures > Q5.cpp > ...
1  #include<iostream>
2  using namespace std;
3
4  struct phone
5  {
6      int area_code;
7      int exchange;
8      int number;
9  };
10
11
12  int main()
13  {
14      phone p1,p2;
15
16      cout<<"Enter your area code, exchange, and number: ";
17      cin >> p2.area_code >> p2.exchange >> p2.number;
18
19      p1.area_code = 212;
20      p1.exchange = 767;
21      p1.number = 8900;
22
23      cout<<"My number is ("<<p1.area_code<<") "<<p1.exchange<<"- "<<p1.number<<endl;
24      cout<<"Your number is ("<<p2.area_code<<") "<<p2.exchange<<"- "<<p2.number<<endl;
25
26  }
```

Output:

```
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PS D:\oop_lab_assignment> cd "d:\oop_lab_assignment\Structures"
PS D:\oop_lab_assignment\Structures> & .\"Q5.exe"
Enter your area code, exchange, and number: 12 12 12
My number is (212) 767-8900
Your number is (12) 12-12
PS D:\oop_lab_assignment\Structures> █
```

6. Implement the given nested structure in the following figures. Note: Only write the definitions of structs nothing else. It is not a complete program.

Code:

```
Q6.cpp X
Structures > Q6.cpp > ...
1  #include<iostream>
2  using namespace std;
3  struct Employee
4  {
5      string name;
6      int Emp_id;
7      string gender;
8      int Age;
9      struct Date_of_Birth;
10
11     struct Date_of_Birth
12     {
13         int day;
14         int month;
15         int year;
16     };
17 };
18 struct Food
19 {
20     struct Vegetable;
21     struct Fruit;
22
23     struct Vegetable
24     {
25         string Food;
26     };
27
28     struct Fruit
29     {
30         string Food;
31     };
32 };
33 int main()
34 {
35     Employee e1,e2;
36     Food f1,f2;
37 }
```