OOPS Lab File

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1. Display the following pattern using nested loops.

55555
4444
333
22
1

```
#include <bits/stdc++.h>
#include <iostream>
using namespace std;

int main()
{
   ios_base::sync_with_stdio(false);
   cin.tie(NULL);
   int i = 6, j ;
   while(i-- && i >= 1) {  // nested loops to print the pattern
         j = i - 1 ;
         while(j--) {
                  cout << i ;
         }
         cout << i ;
         cout << '\n' ;
   }
   return 0;
}
```

Input	Output
-	55555 4444 333 22 1

2. WAP to find value for cos(x) series.

```
#include <bits/stdc++.h>
#include <iostream>
using namespace std;

ll fac(int n) {
        if(n == 1 || n == 0) return 1 ;
        return n * fac(n - 1) ;
}
int main()
{
        double x ;
        cout << "Enter the value of x (in radians): " ; // taking input
        cin >> x ;
        long double cos = 1 - (float)pow(x,2)/fac(2) + (float)pow(x,4)/fac(4) -
(float)pow(x,6)/fac(6) ; //applying the formula
        cout << (long double)cos << '\n' ; //printing the result
   return 0;
}
```

Input	**Output**
2	-0.422222
1	0.540278
3	-1.1375

3. WAP to find value for e raised to the power x series.

```
#include <bits/stdc++.h>
#include<iostream>

using namespace std;

double fun(int x, int n) {
        double e = 1 ;                  // answer
        double temp = 1 ;               // 0th term in the ex sequence
        for(int i=1;i<=n;i++) {         // next term = previous term * (x/i)
           temp *= (double)x/i ;        // calculating the term
           e += temp;                   // adding up all the terms
        }
   return e ;
}

int main()
{
        int n, x ;
        cout << "Enter the value of x and n respectively: " ;
        cin >> x >> n ;
        cout << fun(x, n) << '\n' ;
   return 0;
}
```

Input	**Output**
1 10	2.71828
2 10	7.38899
3 10	20.0797

4. WAP to input array of numbers and sort them into ascending order.

```
#include <bits/stdc++.h>
#include<iostream>

using namespace std;

int main()
{
   int n, i ;
        cout << "Enter the size of the array: " ;
   cin >> n ;
   int a[n] ;
   cout << "Enter the unsorted array: " ;
   cout << '\n' ;
   for( i = 0 ; i < n ; i++) {
        cin >> a[i] ;
   }
   sort(a, a + n) ; // sorting function
   cout << "Sorted array: " ;
   for( i = 0 ; i < n ; i++) {
        cout << a[i] << " ";
   }
   cout << '\n' ;
   return 0;
}
```

Input	**Output**
5 4 8 5 2 1	1 2 4 5 8
7 5 4 2 34 13 1	1 2 4 5 13 34
10 10 9 8 7 6 5 4 3 2 1	1 2 3 4 5 6 7 8 9 10

5. WAP that uses a class where the member functions are defined inside a class.

```
#include <bits/stdc++.h>
#include<iostream>
using namespace std;
class Box {
        public:
                double length, breadth;          //variables
                double getArea() {               //methods inside the class
                  return length * breadth ;
                }
                void setLength(double len) {
                  length = len;
                }
                void setBreadth(double bre) {
                  breadth = bre;
                }
};

int main() { // main function for the program
        int l, b;
        Box Box1;                                // variable box declaration
        double area = 0.0;                       // area variable
        cout << "Enter Length: " ;
        cin >> l ;
        cout << "Enter Breadth: " ;
        cin >> b ;
        Box1.setLength(l) ;                      // calling methods
        Box1.setBreadth(b) ;
        area = Box1.getArea();
        cout << "Area of Box : " << area <<endl; // printing area
        return 0 ;
}
```

Input	**Output**
7 6	42
8 6	48

6. WAP that uses a class where the member functions are defined outside a class.

```
#include <bits/stdc++.h>
#include <iostream>
using namespace std;

class Box {
        public:
                double length, breadth;      // declaring variables
                double getArea() ;
                void setLength(double len) ;
                void setBreadth(double bre) ;
};
double Box::getArea() { return length * breadth ; }
                                                // member functions outside the class
void Box::setLength(double len) { length = len; }
void Box::setBreadth(double bre) { breadth = bre; }

int main() {                                    // main function for the program
        Box Box1;                               // variable box declaration
        double area = 0.0;                      // area variable
        double l, b ;
        cout << "Enter Length: " ;
        cin >> l ;
        cout << "Enter Breadth: " ;
        cin >> b ;
        Box1.setLength(l);     // calling methods
        Box1.setBreadth(b);

        area = Box1.getArea();
        cout << "Area of Box : " << area <<endl; // printing area
        return 0 ;
}
```

Input	**Output**
7 6	42
8 6	48

7. WAP to demonstrate the use of static data members.

```
#include <iostream>
#include <bits/stdc++.h>

using namespace std;

class Box{                          //static data members are the attribute of the class

        public:
                double length, breadth;             // declaring variables
                void setLength(double len) { length = len; }
                void setBreadth(double bre) { breadth = bre; }
                static int countOfBoxes ;           // static variable
                Box() {                             // use of static variable
                        countOfBoxes ++ ;
                }
};
// NOTE: static methods can can only call static data members but non-static
//methods can access both static and non-static data members


int Box::countOfBoxes ;                 //declaring memory for static data variable

int main() {                            // main function for the program
        Box Box1, Box2, Box3;    // variable box declarations
        cout << "Count of Boxes : " << Box1.countOfBoxes <<endl;
        Box Box4;
        cout << "Count of Boxes after declaring one more box : " <<
Box1.countOfBoxes <<endl;
        return 0 ;
}
```

Input	**Output**
-	3 4

8. WAP to demonstrate the use of const data members.

```
#include <bits/stdc++.h>
#include <iostream>

using namespace std;

class student {
        public:
                const string name ;                     // cons data member
                // initialising const data members outside the class (initialiser list)
                student(string name_entered): name(name_entered) {} ;
};


int main() {                                            // main function for the program
                                                        // declaring objects
        student s1("Honey Singh"), s2("Mika Singh"), s3("Eminem Dattalol");
        cout << s1.name << '\n' ; // can't be changed
        cout << s2.name << '\n' ; // can't be changed
        cout << s3.name << '\n' ; // can't be changed
        return 0 ;
}
```

Input	**Output**
-	Honey Singh Mika Singh Eminem Dattalol

9. WAP to accept Class student having following members: -

Data members: Roll No., Name, Address

Class member functions: getdata, displayData()

```
#include <bits/stdc++.h>
#include<iostream>

using namespace std;


class student {
        public:
                int rollNo ;                            // declaring variables
                string address, name ;
                void getData() {                        // methods inside the class
                  cout << "Enter the name of the student: " ;
                  getline (cin, name);
                  cout << "Enter the roll no. of the student: " ;
                  cin >> rollNo ;
                  cin.ignore() ;
                  cout << "Enter the address of the student: " ;
                  getline (cin, address );

                }
                void displayData() {
                  cout << "Name: " << name << '\n' ;
                  cout << "Roll No.: " << rollNo << '\n' ;
                  cout << "Address: " << address << '\n' ;
                }
};
```

```
// main function for the program
int main() {
        student student1;                       // variable box declaration
        student1.getData();                     // calling methods
        student1.displayData();
}
```

Input	**Output**
Prabhav Dogra 58 Xyz 123	Prabhav Dogra 58 Xyz 123

10. WAP for banking system where balance is read from keyboard perform following takes:

1. **To deposit**
2. **To withdraw**
3. **To know balance**

```
#include <bits/stdc++.h>
#include<iostream>
using namespace std;

class bankAccount{
	private:
		string first_name, last_name ;
		double balance = 0 ;

	public:
		//constructing a bank account
		bankAccount() {
			cout << "Enter the first name of the Account holder: " ;
			cin >> first_name ;
			cout << "Enter the last name of the Account holder: " ;
			cin >> last_name ;
			cout << "Enter the balance amount: "
			cin >> balance ;
		}
		double getBalance() {
			return balance ;
		}
		void deposit(double a) {
			balance += a ;
		}
		void withdraw(double a) {
			if(balance - a >= 0) balance -= a ;
			else cout << "Insufficient Balance" << '\n' ;
		}
};
```

```
int main()
{
        bankAccount p1 ;
        int n = 0 ;
        while (n != 4) {
           cout << "Enter what you want to do: \n1. To deposit\n2.
           To withdraw\n3. To balance\n4. Exit\n" ;
           cout << "Enter your choice: " ;
           cin >> n ;
           double  x ;
           if(n == 4) continue ;
           else if(n == 3) cout << p1.getBalance() <<'\n' << '\n' ;
           else if(n == 2) {
                cout << "Enter the amount you want to withdraw: " ;
                cin >> x ;
                p1.withdraw(x) ;
                }
           else if(n == 1) {
                cout << "Enter the amount you want to deposit: " ;
                cin >> x ;
                p1.deposit(x) ;
                }
           else cout << "Invalid Choice" ;
        }
   return 0;
}
```

Input	**Output**
Prabhav Dogra 5000 2 (Withdrawal) 3000 1 4000 3 2	- - - - - - - 6000 -

7000 5 4	Insufficient Balance Invalid Choice -