2- Repetitively (Loop): Additional Examples:

Example 1: Find the sum of first n Natural Numbers:

```
#include <iostream>
using namespace std;

int main()
{
int n, sum;

sum = 0;

cout << "Enter a positive integer: \n";
cin >> n;

for (int i = 1; i <= num; ++i) {
      sum += i;
}
cout << "\n Sum = " << sum << endl;

return (0);
}
```

```
Execute:

Enter a positive integer:
10
Sum = 55
```

Example 2: Write C++ program to find the factorial of n (using for statement):
n! = n * n-1 * n-2 * n-3 * … * 2 * 1

```
#include <iostream>
using namespace std;

int main()
{
int n, f = 1;

cout << "Enter positive number: \n";
cin >> n;

for ( int i = 2; i <= n; i ++ )
      f = f * i;

cout << "\n factorial is: " << f;
return 0;
}
```

```
Execute:

Enter positive number:
5
Factorial is: 120
```

Example 3: Write C++ program to the result of the following: $\sum_{i=1}^{20} {a_i}^2$

```
#include <iostream>
using namespace std;

int main()
{
int sum = 0;
for ( int i = 1; i <= 20; i ++ )
      sum = sum + ( i * i );

cout << "The sum is: " << sum;
return 0;
}
```

```
Execute:

The sum is: 2870
```

Example 4: Write C++ program to the result of the following: $\sum_{i=1}^{5} \sum_{j=1}^{10} i + 2j$

```
#include <iostream>
using namespace std;

int main()
{
int i, j, sum = 0;

for ( i = 1; i <= 5; i ++ )
      for ( j = 1; j <= 10; j ++ )
            sum = sum + ( i + 2 * j );

cout << "sum is:" << sum;
return 0;
}
```

```
Execute:

The sum is: 700
```

Example 5: What is the output of the following C++ program:

```
#include <iostream>
using namespace std;

int main()
{
int i, j;

for ( i = 1; i <= 3; i ++ )
      for ( j = 1; j <= 3; j ++ ){
            cout << "i = " << i ;
            cout << ", j = " << j << endl;
            }
return 0;
}
```

```
Execute:

i = 1, j = 1
i = 1, j = 2
i = 1, j = 3
i = 2, j = 1
i = 2, j = 2
i = 2, j = 3
i = 3, j = 1
i = 3, j = 2
i = 3, j = 3
```

Example 6: Write C++ program to print out the following

```
+
++
+++
++++
+++++
++++++
+++++++
```

```
#include <iostream>
using namespace std;

int main(){

int i, j;

for ( i = 1; i <= 10; i ++ ){
      for ( j = 1; j <= i; j ++ )
            cout << " + ";
      cout << "\n";
}

return 0;
}
```

```
Execute:

+
++
+++
++++
+++++
++++++
+++++++
```

Example 7: Write C++ program to print out the following

1 2 3 4 5 6 7 8 9 10
2 4 6 8 10 12 14 16 18 20
3 6 9 12 15 18 21 24 27 30
4 8 12 16 20 24 28 32 36 40
5 10 15 20 25 30 35 40 45 50

```
#include <iostream>
using namespace std;

int main(){

int i, j;

for ( i = 1; i <= 5; i ++ ){
      for ( j = 1; j <= 10; j ++ )
            cout << I * j << " ";
      cout << "\n";
}

return 0;
}
```

```
Execute:

1 2 3 4 5 6 7 8 9 10
2 4 6 8 10 12 14 16 18 20
3 6 9 12 15 18 21 24 27 30
4 8 12 16 20 24 28 32 36 40
5 10 15 20 25 30 35 40 45 50
```

Example 8: Write a program to find the following series

$S = 2^1 + 2^2 + 2^3 \ldots\ldots\ldots + 2^{10}$

```
#include <iostream>
#include <math.h>
using namespace std;

int main(){

int i;
double s=0;

for ( i = 1; i <= 10; i ++ )
            s += pow(2, i);

cout << "s = " << s;

return 0;
}
```

Example 9: Write a program to find the following series

$S = 4 - 4/2 + 4/3 - 4/4 + 4/5 - 4/6 + 4/7 - \ldots.. + 4/15$

```
#include <iostream>
using namespace std;
int main ()
{

int i;
double s=0;

for ( i = 1; i <= 15; i ++ )
    if (i % 2 == 0)
        s += 4/i;
    else
        s -= 4/i;


cout << "s = " << s;
return 0;
}
```

Example 10: Write a program to read a number of marks for a student, for each mark, check and print the following

50...59 print (Accept)

60...69 print (Medium)

70...79 print(Good)

80...89 print(Very Good)

90...100 print (Excellent)

0...50 print (Fail)

```
#include <iostream>
using namespace std;

int main()
{
int n , i;
int Mark ;
cout<<"Please Enter The Number Marks"<<endl ;
 cin>>n ;
 i = 1 ;
 while (i <= n) {
     cout<<"Please Enter Your Mark" <<endl ;
     cin>>Mark ;
     if (Mark >=50 && Mark <=59)
        cout <<"Accept \n" ;
     else if (Mark >=60 && Mark <=69)
        cout <<"Medium \n" ;
     else if (Mark >=70 && Mark<=79)
        cout <<"Good \n";
     else if (Mark >=80 && Mark <=89)
        cout<<"Very Good \n";
     else if (Mark >=90 && Mark <=100)
        cout<<"Excellent \n" ;
     else cout<<"Fail" ;
     i = i + 1 ;
    }

      return 0;
}
```