Lecture Notes No. (7-B): Nested Loops

A nested loop is a loop in which one loop resides inside another loop where the inner loop gets executed first, satisfying all the set of conditions that prevailed within the loop followed by an outer loop set of conditions. Execution of statements within the loop flows in a way that the inner loop of the nested loop gets declared, initialized and then incremented. Once all the condition within the inner loop gets satisfied and becomes true, it moves for the search of the outer loop. It is often called a "loop within a loop".

Example:

Write C++ program to draw the following pattern:

```
*****
*****
*****
*****
*****
```

Solution:

using **for**

```
#include<iostream>
using namespace std;
int main()
{
for(int i=1;i<=5;i++)
{
    for(int j=1;j<=5;j++)
     {
          cout<<"*";
     }
     cout<<endl;
}
return 0;
}
```

using **while**

```
#include<iostream>
using namespace std;
int main()
{
int i=1,j;
while(i<=5)
{
    j=1;
    while(j<=5)
     {
          cout<<"*";
         j++;
     }
     cout<<endl;
    i++;
}
return 0;
}
```

Exercises

Write C++ Programs to draw the following patterns**:**

1.	11111 22222 33333 44444 55555
2.	12345 12345 12345 12345 12345

3.	54321 54321 54321 54321 54321
4.	55555 44444 33333 22222 11111
5.	* ** *** **** *****
6.	1 22 333 4444 55555
7.	1 12 123 1234 12345
8.	***** **** *** ** *

9.	<pre> * ** *** **** *****</pre>

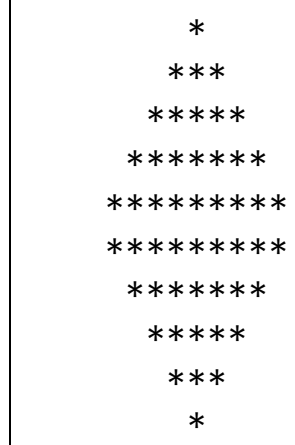
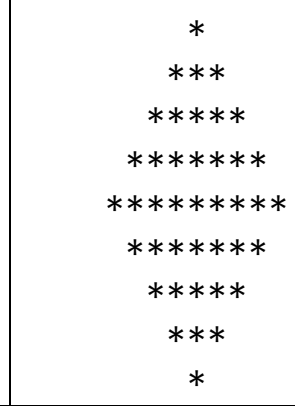
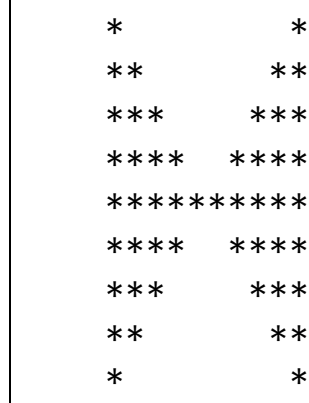
10.	<pre> 1
	   12
	  123
	 1234
	12345</pre>

11.	<pre> 1
	   22
	  333
	 4444
	55555</pre>

12.	<pre> 1
	   21
	  321
	 4321
	54321</pre>

13.	<pre> * *** ***** ******* *********</pre>

14.	<pre>*********
	 *******
	  *****
	   ***
	    *</pre>

15.	
16.	
17.	

Exercises Solutions:

1.

```
#include<iostream>
using namespace std;
int main()
{
for(int i=1;i<=5;i++)
{
    for(int j=1;j<=5;j++)
     {
          cout<<i;
     }
     cout<<endl;
}
return 0;
}
```

2.

```
#include<iostream>
using namespace std;
int main()
{
for(int i=1;i<=5;i++)
{
    for(int j=1;j<=5;j++)
     {
          cout<<j;
     }
     cout<<endl;
}
return 0;
}
```

3.

```
#include<iostream>
using namespace std;
int main()
{
for(int i=1;i<=5;i++)
{
    for(int j=5;j>=1;j--)
     {
          cout<<j;
     }
     cout<<endl;
}
return 0;
}
```

Another Solution

```
#include<iostream>
using namespace std;
int main()
{
for(int i=1;i<=5;i++)
{
    for(int j=1;j<=5;j++)
     {
          cout<<6-j;
     }
     cout<<endl;
}
return 0;
}
```

4.

```
#include<iostream>
using namespace std;
int main()
{
for(int i=5;i>=1;i--)
{
    for(int j=1;j<=5;j++)
     {
          cout<<i;
     }
     cout<<endl;
}
return 0;
}
```

Another Solution

```
#include<iostream>
using namespace std;
int main()
{
for(int i=1;i<=5;i++)
{
    for(int j=1;j<=5;j++)
     {
          cout<<6-i;
     }
     cout<<endl;
}
return 0;
}
```

5.

```
#include<iostream>
using namespace std;
int main()
{
for(int i=1;i<=5;i++)
{
    for(int j=1;j<=i;j++)
     {
          cout<<"*";
     }
     cout<<endl;
}
return 0;
}
```

6.

```
#include<iostream>
using namespace std;
int main()
{
for(int i=1;i<=5;i++)
{
    for(int j=1;j<=i;j++)
     {
          cout<<i;
     }
     cout<<endl;
}
return 0;
}
```

7.

```
#include<iostream>
using namespace std;
int main()
{
for(int i=1;i<=5;i++)
{
    for(int j=1;j<=i;j++)
     {
          cout<<j;
     }
     cout<<endl;
}
return 0;
}
```

8.

```
#include<iostream>
using namespace std;
int main()
{
for(int i=5;i>=1;i--)
{
    for(int j=1;j<=i;j++)
     {
          cout<<"*";
     }
     cout<<endl;
}
return 0;
}
```

Another Solution

```
#include<iostream>
using namespace std;
int main()
{
for(int i=1;i<=5;i++)
{
    for(int j=i;j<=5;j++)
     {
          cout<<"*";
     }
     cout<<endl;
}
return 0;
}
```

9.

```
#include<iostream>
using namespace std;
int main()
{
for(int i=1;i<=5;i++)
{
     for(int j=i;j<=5;j++)
     {
          cout<<" ";
     }
    for(int k=1;k<=i;k++)
     {
          cout<<"*";
     }
     cout<<endl;
}
return 0;
}
```

10.

```
#include<iostream>
using namespace std;
int main()
{
for(int i=1;i<=5;i++)
{
     for(int j=i;j<=5;j++)
     {
          cout<<" ";
     }
    for(int k=1;k<=i;k++)
     {
          cout<<k;
     }
     cout<<endl;
}
return 0;
}
```

11.

```
#include<iostream>
using namespace std;
int main()
{
for(int i=1;i<=5;i++)
{
     for(int j=i;j<=5;j++)
     {
          cout<<" ";
     }
    for(int k=1;k<=i;k++)
     {
          cout<<i;
     }
     cout<<endl;
}
return 0;
}
```

12.

```
#include<iostream>
using namespace std;
int main()
{
for(int i=1;i<=5;i++)
{
     for(int j=i;j<=5;j++)
     {
          cout<<" ";
     }
    for(int k=i;k>=1;k--)
     {
          cout<<k;
     }
     cout<<endl;
}
return 0;
}
```

13.

```
#include<iostream>
using namespace std;
int main()
{
for(int i=1;i<=5;i++)
{
     for(int j=i;j<=5;j++)
     {
          cout<<" ";
     }
    for(int k=1;k<=2*i-1;k++)
     {
          cout<<"*";
     }
     cout<<endl;
}
return 0;
}
```

14.

```
#include<iostream>
using namespace std;
int main()
{
for(int i=1;i<=5;i++)
{
     for(int j=1;j<=i;j++)
     {
          cout<<" ";
     }
    for(int k=1;k<=2*(6-i)-1;k++)
     {
          cout<<"*";
     }
     cout<<endl;
}
return 0;
}
```

15.

```
#include<iostream>
using namespace std;
int main()
{
for(int i=1;i<=5;i++)
{
     for(int j=i;j<=5;j++)
     {
          cout<<" ";
     }
    for(int k=1;k<=2*i-1;k++)
     {
          cout<<"*";
     }
     cout<<endl;
}
```

```
for(int i=1;i<=5;i++)
{
     for(int j=1;j<=i;j++)
     {
          cout<<" ";
     }
    for(int k=1;k<=2*(6-i)-1;k++)
     {
          cout<<"*";
     }
     cout<<endl;
}

return 0;
}
```

16.

```
#include<iostream>
using namespace std;
int main()
{
for(int i=1;i<=5;i++)
{
     for(int j=i;j<=5;j++)
     {
          cout<<" ";
     }
    for(int k=1;k<=2*i-1;k++)
     {
          cout<<"*";
     }
     cout<<endl;
}

for(int i=1;i<=4;i++)
{
     for(int j=1;j<=i+1;j++)
     {
          cout<<" ";
```

```
     }
    for(int k=1;k<=2*(5-i)-1;k++)
     {
          cout<<"*";
     }
     cout<<endl;
}

return 0;
}
```

17.

Try it yourself 😊