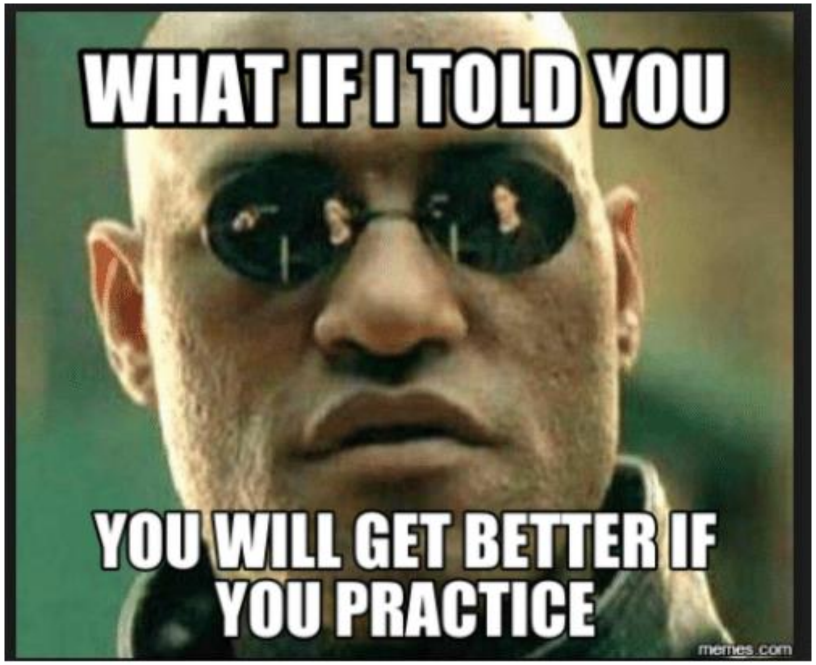
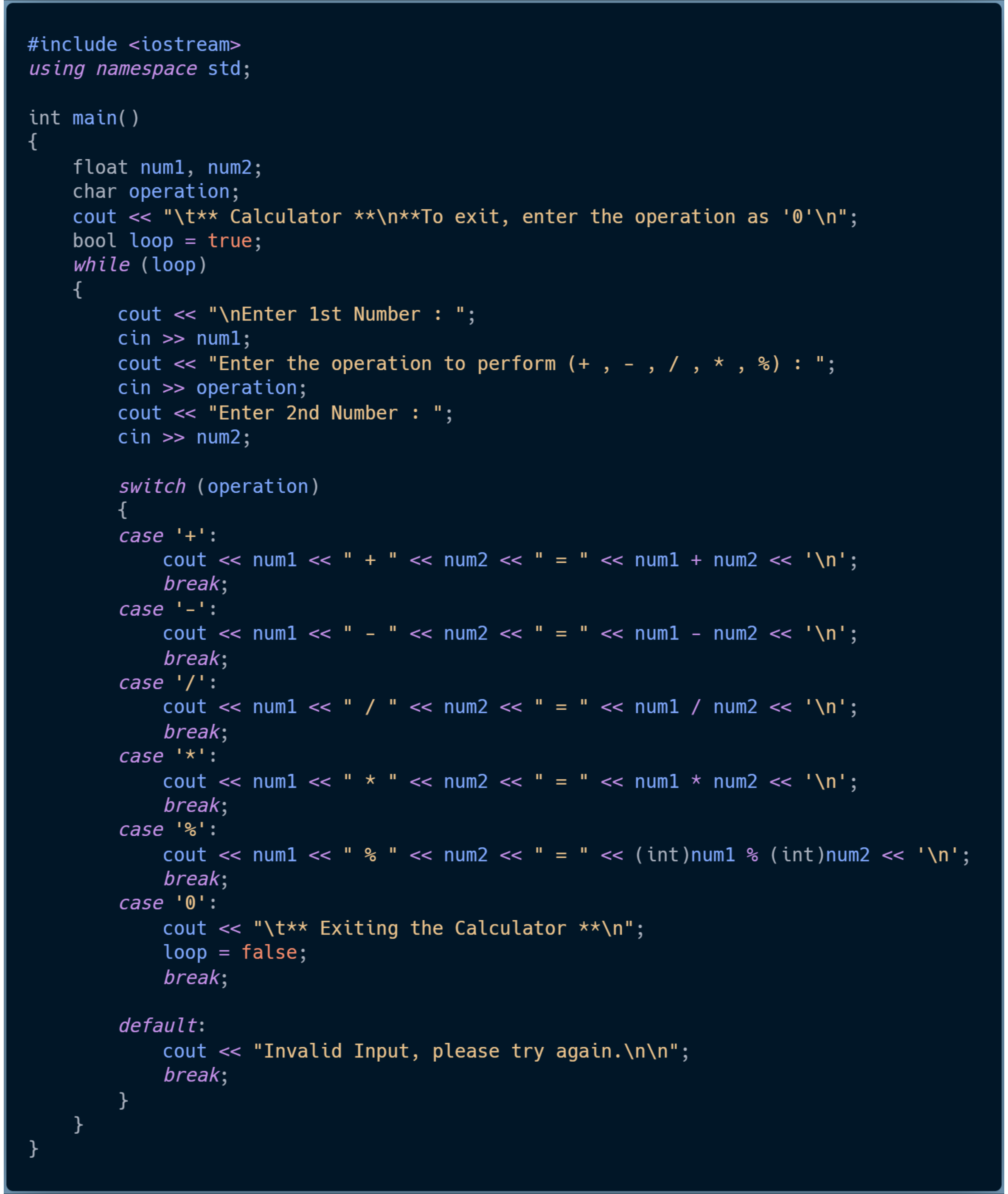
Techimax

Fundamentals of Programming in C++



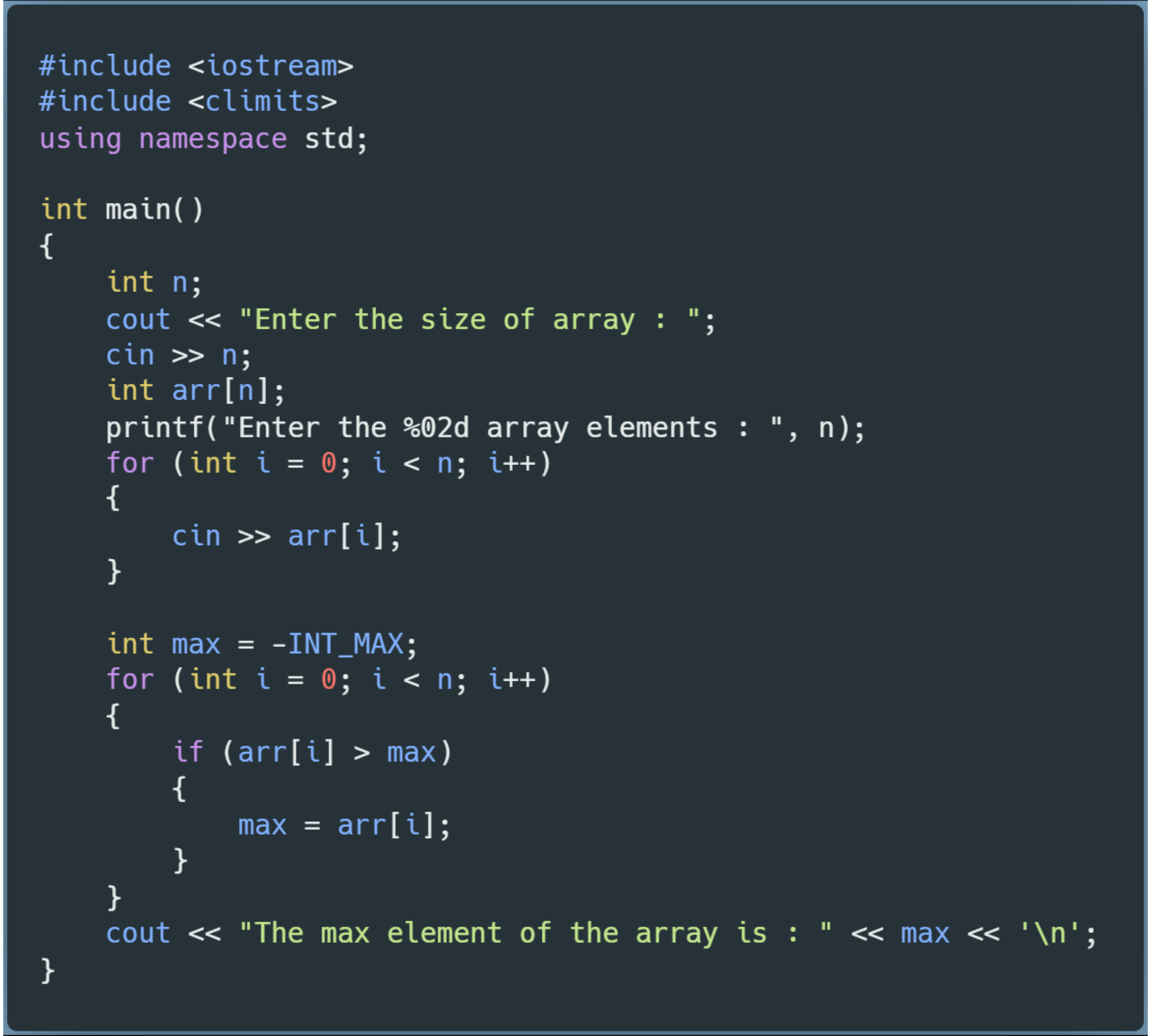
Make a Calculator

Take two numbers and
a mathematical operator as input.
print the output of the arithematic operation.



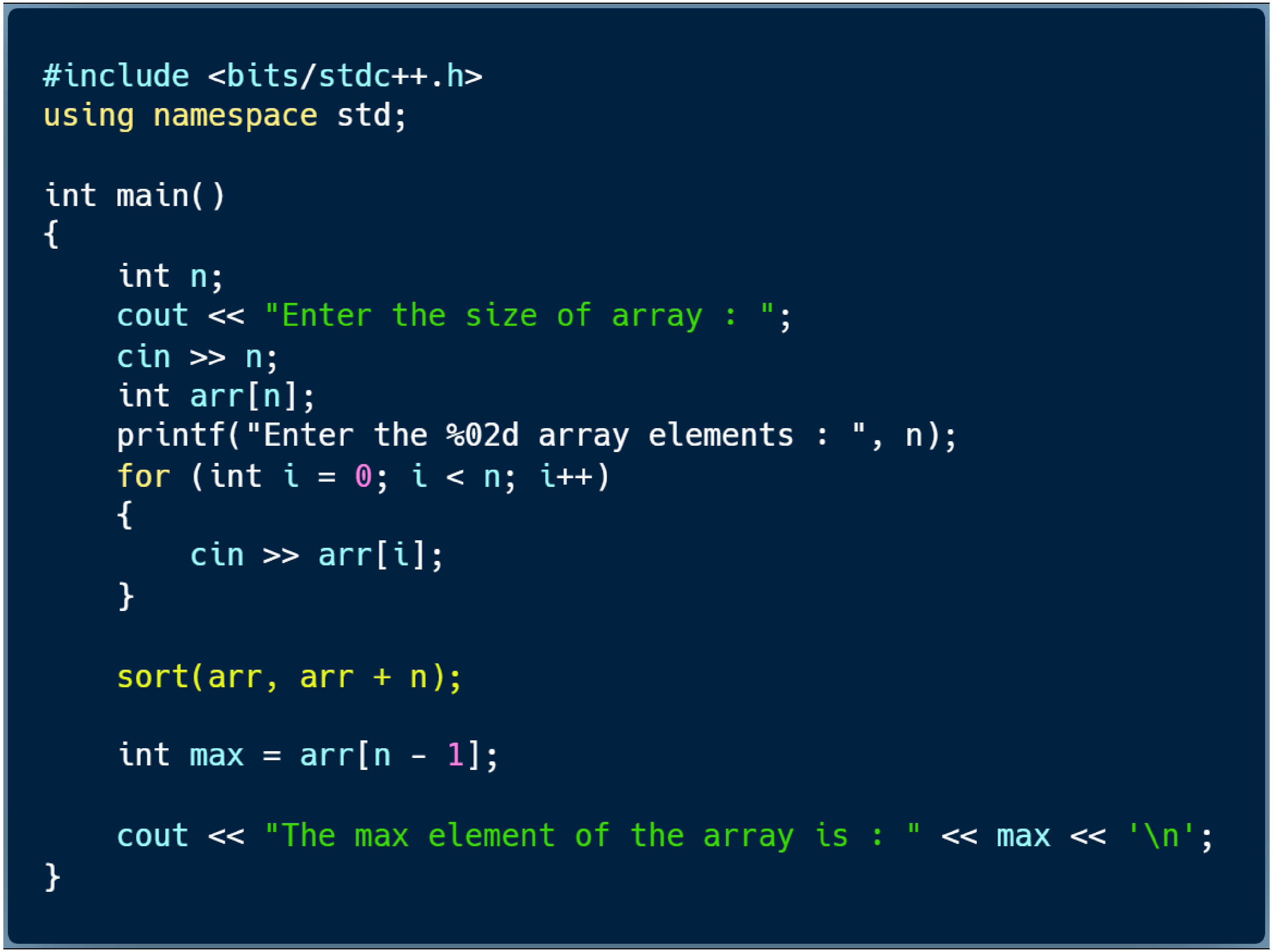
```cpp
#include <iostream>
using namespace std;

int main()
{
    float num1, num2;
    char operation;
    cout << "\t** Calculator **\n**To exit, enter the operation as '0'\n";
    bool loop = true;
    while (loop)
    {
        cout << "\nEnter 1st Number : ";
        cin >> num1;
        cout << "Enter the operation to perform (+ , - , / , * , %) : ";
        cin >> operation;
        cout << "Enter 2nd Number : ";
        cin >> num2;

        switch (operation)
        {
        case '+':
            cout << num1 << " + " << num2 << " = " << num1 + num2 << '\n';
            break;
        case '-':
            cout << num1 << " - " << num2 << " = " << num1 - num2 << '\n';
            break;
        case '/':
            cout << num1 << " / " << num2 << " = " << num1 / num2 << '\n';
            break;
        case '*':
            cout << num1 << " * " << num2 << " = " << num1 * num2 << '\n';
            break;
        case '%':
            cout << num1 << " % " << num2 << " = " << (int)num1 % (int)num2 << '\n';
            break;
        case '0':
            cout << "\t** Exiting the Calculator **\n";
            loop = false;
            break;

        default:
            cout << "Invalid Input, please try again.\n\n";
            break;
        }
    }
}
```

Given the size of an array and its elements, write a function to get its maximum element.



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

int main()
{
    int n;
    cout << "Enter the size of array : ";
    cin >> n;
    int arr[n];
    printf("Enter the %02d array elements : ", n);
    for (int i = 0; i < n; i++)
    {
        cin >> arr[i];
    }

    int max = -INT_MAX;
    for (int i = 0; i < n; i++)
    {
        if (arr[i] > max)
        {
            max = arr[i];
        }
    }
    cout << "The max element of the array is : " << max << '\n';
}
```

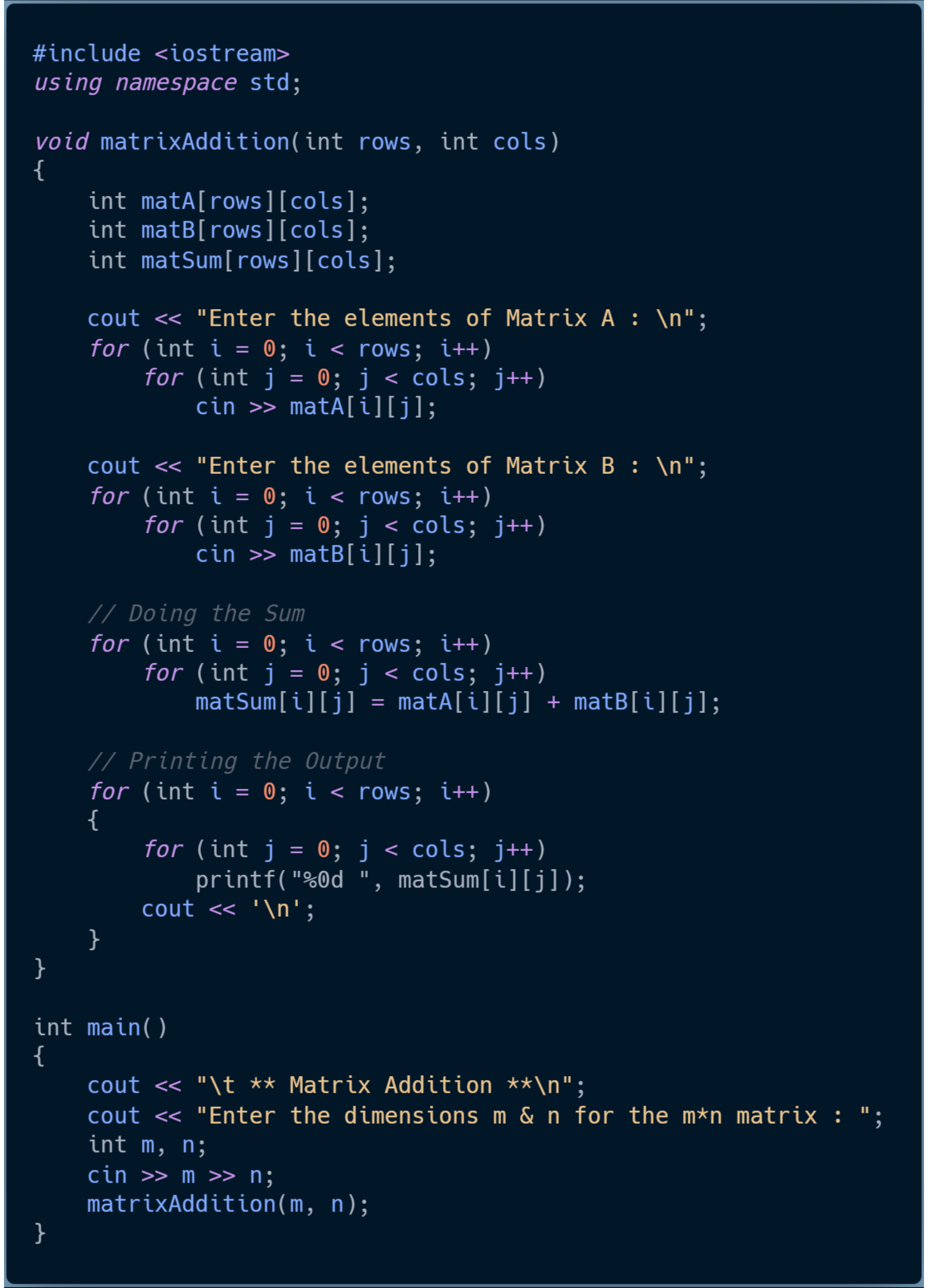
Using STL (Standard Template Library)



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

int main()
{
    int n;
    cout << "Enter the size of array : ";
    cin >> n;
    int arr[n];
    printf("Enter the %02d array elements : ", n);
    for (int i = 0; i < n; i++)
    {
        cin >> arr[i];
    }

    sort(arr, arr + n);

    int max = arr[n - 1];

    cout << "The max element of the array is : " << max << '\n';
}
```

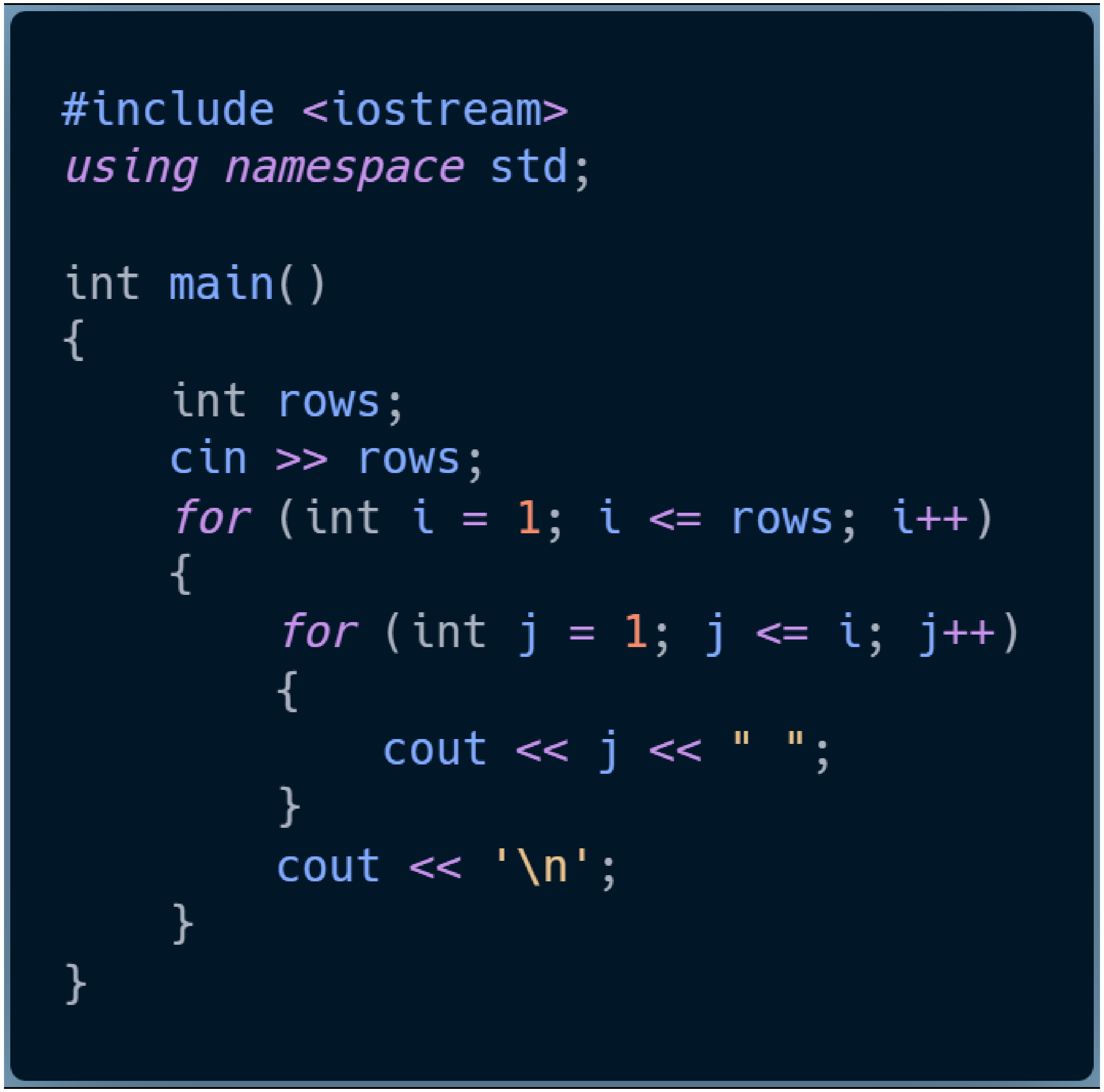
Matrix Addition

Take the dimensions m*n and
the elements of two 2D arrays
as input from the user and
print the resultant array of the matrix addition.

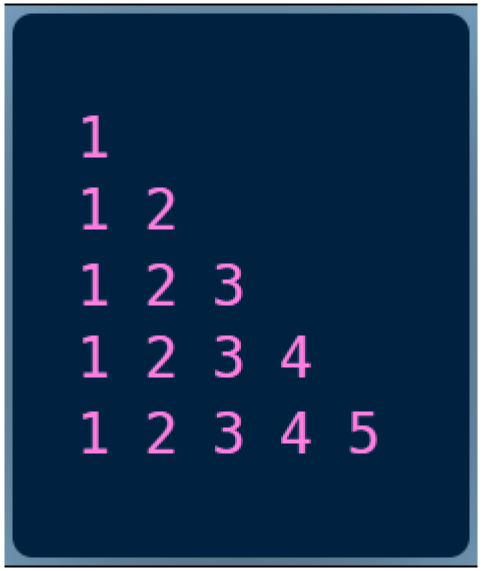


```cpp
#include <iostream>
using namespace std;

void matrixAddition(int rows, int cols)
{
    int matA[rows][cols];
    int matB[rows][cols];
    int matSum[rows][cols];

    cout << "Enter the elements of Matrix A : \n";
    for (int i = 0; i < rows; i++)
        for (int j = 0; j < cols; j++)
            cin >> matA[i][j];

    cout << "Enter the elements of Matrix B : \n";
    for (int i = 0; i < rows; i++)
        for (int j = 0; j < cols; j++)
            cin >> matB[i][j];

    // Doing the Sum
    for (int i = 0; i < rows; i++)
        for (int j = 0; j < cols; j++)
            matSum[i][j] = matA[i][j] + matB[i][j];

    // Printing the Output
    for (int i = 0; i < rows; i++)
    {
        for (int j = 0; j < cols; j++)
            printf("%0d ", matSum[i][j]);
        cout << '\n';
    }
}

int main()
{
    cout << "\t ** Matrix Addition **\n";
    cout << "Enter the dimensions m & n for the m*n matrix : ";
    int m, n;
    cin >> m >> n;
    matrixAddition(m, n);
}
```

Number Triangle

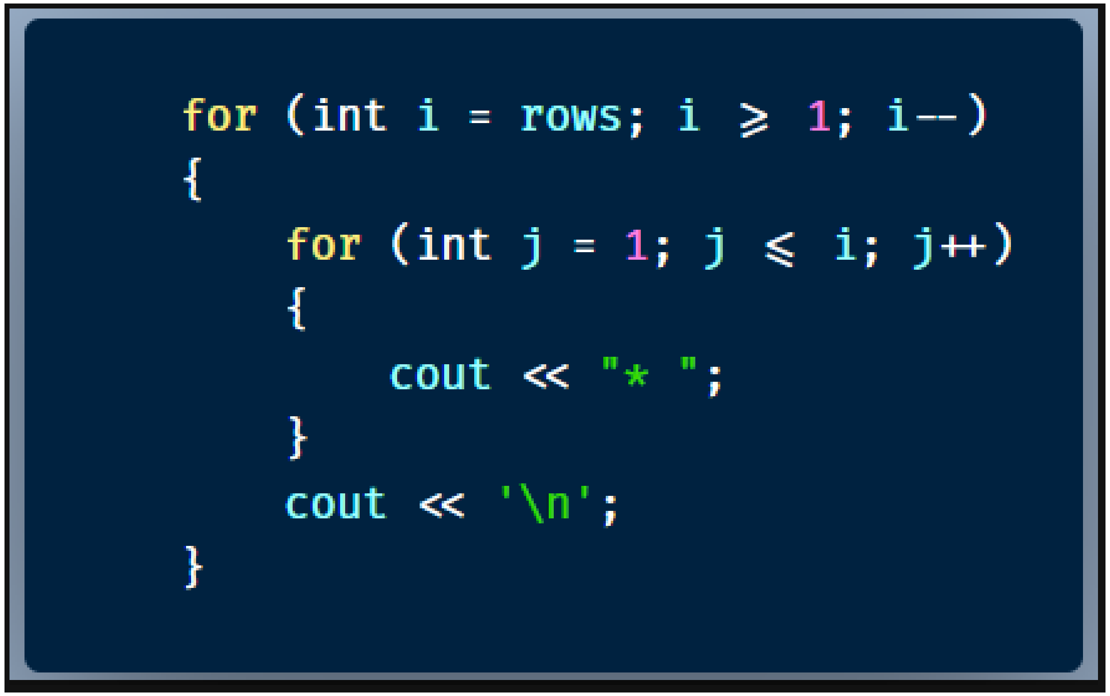


```
#include <iostream>
using namespace std;

int main()
{
    int rows;
    cin >> rows;
    for (int i = 1; i <= rows; i++)
    {
        for (int j = 1; j <= i; j++)
        {
            cout << j << " ";
        }
        cout << '\n';
    }
}
```

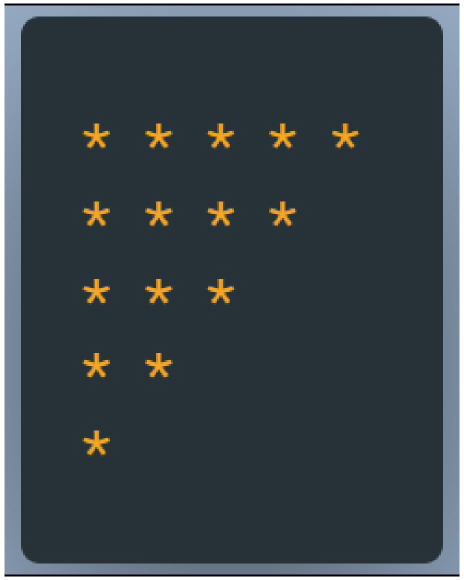


```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
```

Inverted Half Pyramid

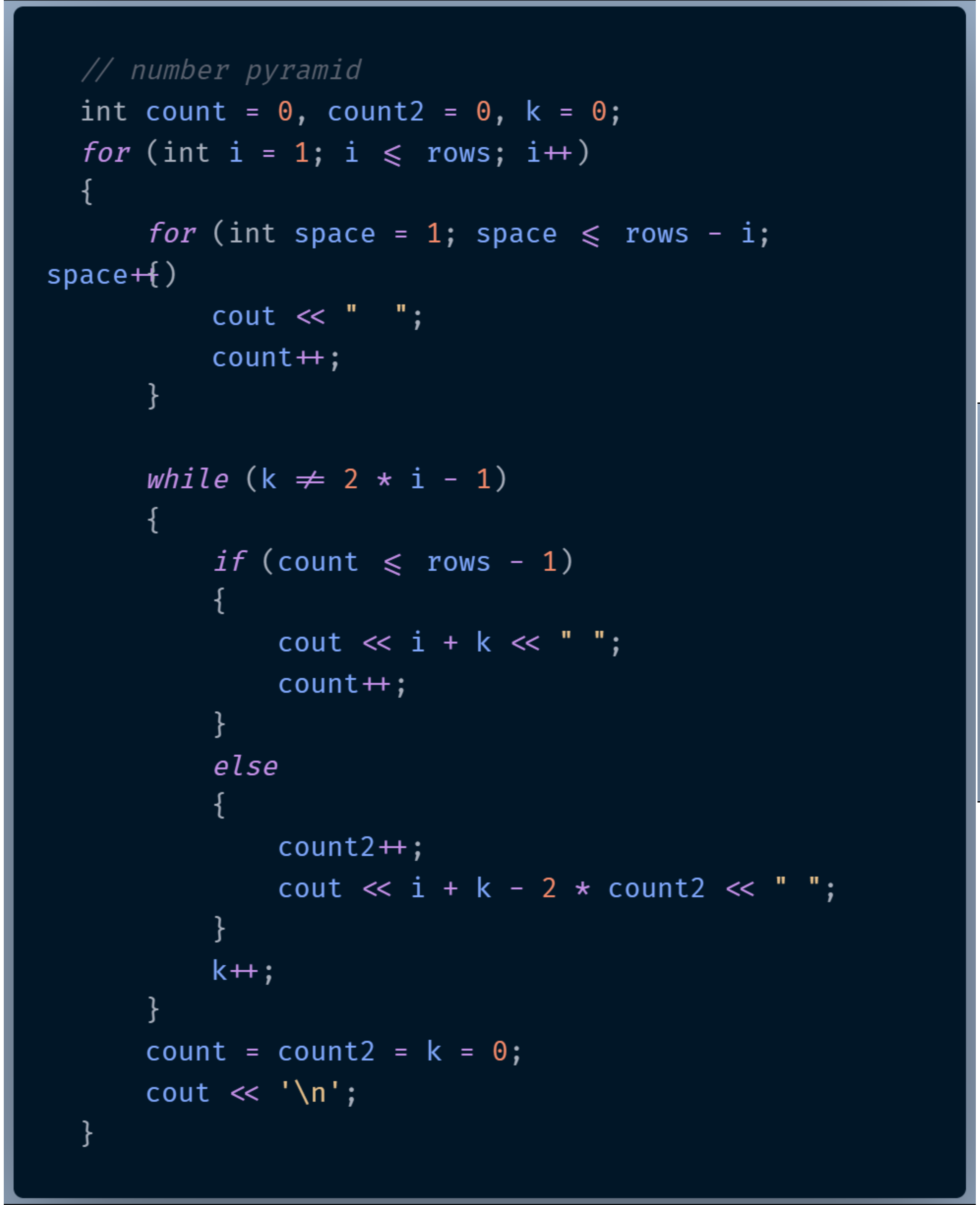


```
for (int i = rows; i >= 1; i--)
{
    for (int j = 1; j <= i; j++)
    {
        cout << "* ";
    }
    cout << '\n';
}
```

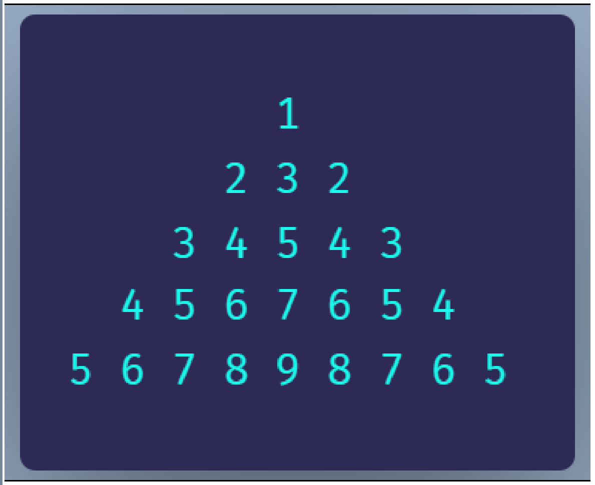


```
* * * * *
* * * *
* * *
* *
*
```

Number Pyramid

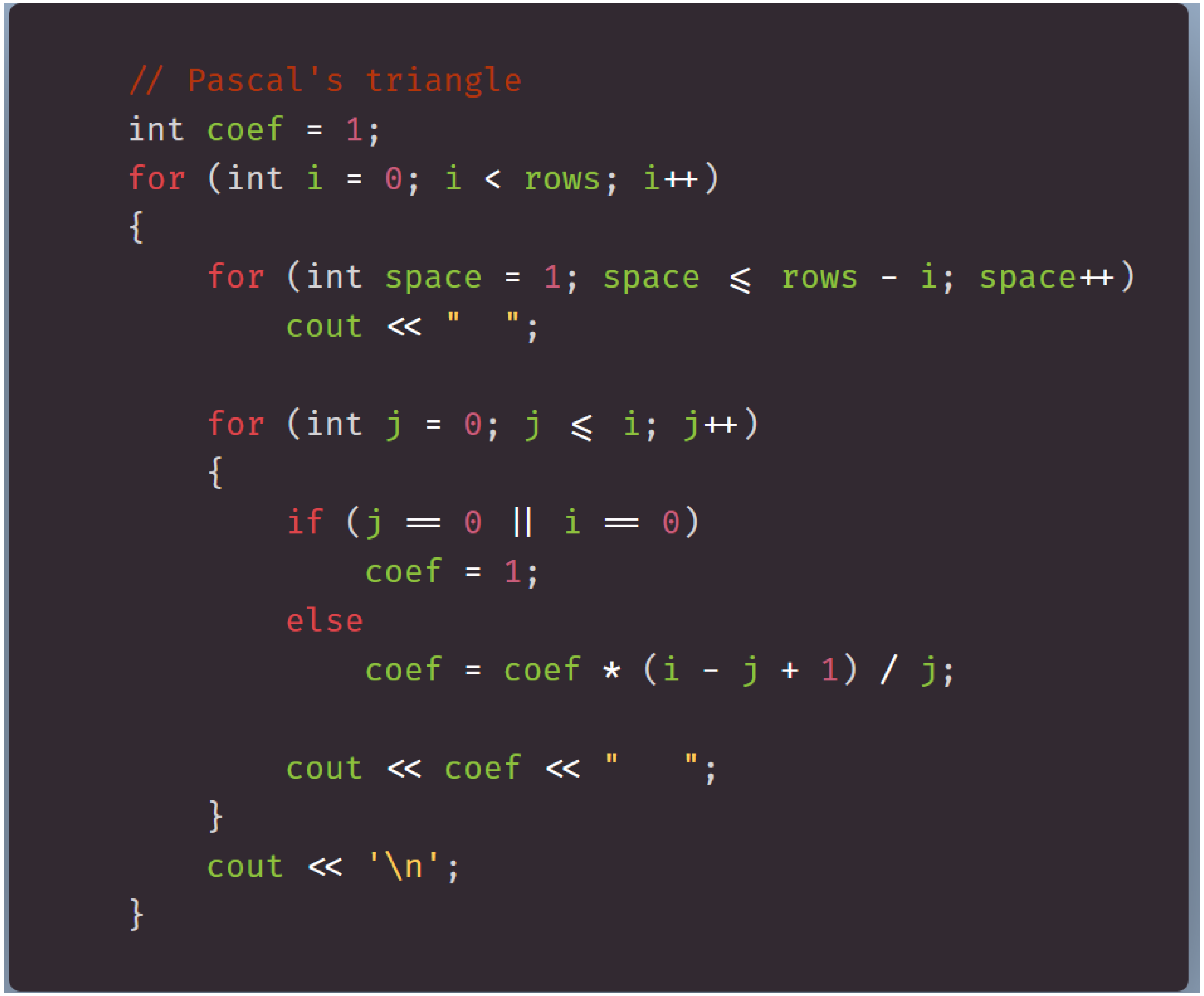


```cpp
  // number pyramid
  int count = 0, count2 = 0, k = 0;
  for (int i = 1; i <= rows; i++)
  {
      for (int space = 1; space <= rows - i;
space++)
          cout << "  ";
          count++;
      }

      while (k != 2 * i - 1)
      {
          if (count <= rows - 1)
          {
              cout << i + k << " ";
              count++;
          }
          else
          {
              count2++;
              cout << i + k - 2 * count2 << " ";
          }
          k++;
      }
      count = count2 = k = 0;
      cout << '\n';
  }
```

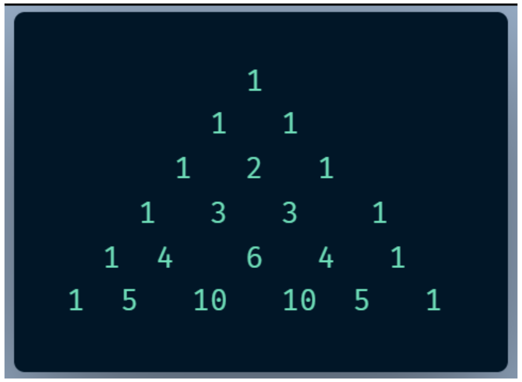


```
        1
      2 3 2
    3 4 5 4 3
  4 5 6 7 6 5 4
5 6 7 8 9 8 7 6 5
```

Pascal’s Triangle



```
// Pascal's triangle
int coef = 1;
for (int i = 0; i < rows; i++)
{
    for (int space = 1; space <= rows - i; space++)
        cout << "  ";

    for (int j = 0; j <= i; j++)
    {
        if (j == 0 || i == 0)
            coef = 1;
        else
            coef = coef * (i - j + 1) / j;

        cout << coef << "    ";
    }
    cout << '\n';
}
```



```
            1
         1     1
      1     2     1
   1     3     3     1
1     4     6     4     1
1   5    10    10    5    1
```