By: Ali Hassan Soomro
BSCS from UBIT, University of Karachi
***Facebook Id**: AliiHassanSoomro*
***Gmail:** alisoomro666@gmail.com*
***Instagram Id**: alihassansoomro__*

C++ Programs
For Exam Preparation

0. Program to print "Hello World!"

```
#include <iostream>

using namespace std;

int main() {

    cout << "Hello World!";

    return 0;
}
```

By: Ali Hassan Soomro
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***Gmail:** alisoomro666@gmail.com*
***Instagram Id**: alihassansoomro__*

1. Program to Check Prime Number

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

int main() {
    int i, n;
    bool isPrime = true;

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

    // 0 and 1 are not prime numbers
    if (n == 0 || n == 1) {
        isPrime = false;
    }
    else {
        for (i = 2; i <= n / 2; ++i) {
            if (n % i == 0) {
                isPrime = false;
                break;
            }
        }
    }
    if (isPrime)
        cout << n << " is a prime number";
    else
        cout << n << " is not a prime number";

    return 0;
}
```

By: Ali Hassan Soomro
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***Gmail:** alisoomro666@gmail.com*
***Instagram Id**: alihassansoomro__*

2. Program to print Half Pyramid

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

Source Code:

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

int main()
{
    int rows;

    cout << "Enter number of rows: ";
    cin >> rows;

    for(int i = 1; i <= rows; ++i)
    {
        for(int j = 1; j <= i; ++j)
        {
            cout << "* ";
        }
        cout << "\n";
    }
    return 0;
}
```

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3. Program to print half pyramid using numbers

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

Source Code:

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

int main()
{
    int rows;

    cout << "Enter number of rows: ";
    cin >> rows;

    for(int i = 1; i <= rows; ++i)
    {
        for(int j = 1; j <= i; ++j)
        {
            cout << j << " ";
        }
        cout << "\n";
    }
    return 0;
}
```

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4. Program to print half pyramid using alphabets

```
A
B B
C C C
D D D D
E E E E E
```

Source Code

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

int main()
{
    char input, alphabet = 'A';

    cout << "Enter the uppercase character you want to print in the last row: ";
    cin >> input;

    for(int i = 1; i <= (input-'A'+1); ++i)
    {
        for(int j = 1; j <= i; ++j)
        {
            cout << alphabet << " ";
        }
        ++alphabet;

        cout << endl;
    }
    return 0;
}
```

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***Gmail:** alisoomro666@gmail.com*
***Instagram Id**: alihassansoomro__*

5. Inverted half pyramid using *

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

Source Code

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

int main()
{
    int rows;

    cout << "Enter number of rows: ";
    cin >> rows;

    for(int i = rows; i >= 1; --i)
    {
        for(int j = 1; j <= i; ++j)
        {
            cout << "* ";
        }
        cout << endl;
    }

    return 0;
}
```

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***Instagram Id**: alihassansoomro__*

6. Inverted half pyramid using numbers

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

Source code

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

int main()
{
    int rows;

    cout << "Enter number of rows: ";
    cin >> rows;

    for(int i = rows; i >= 1; --i)
    {
        for(int j = 1; j <= i; ++j)
        {
            cout << j << " ";
        }
        cout << endl;
    }

    return 0;
}
```

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***Instagram Id**: alihassansoomro__*

7. Programs to display pyramid and inverted pyramid using * and digits (half diamond)

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

Source code

```
#include <iostream>
using namespace std;
int main()
{
    int space, rows;
    cout <<"Enter number of rows: ";
    cin >> rows;

    for(int i = 1, k = 0; i <= rows; ++i, k = 0)
    {
        for(space = 1; space <= rows-i; ++space)
        {
            cout <<"  ";
        }

        while(k != 2*i-1)
        {
            cout << "* ";
            ++k;
        }
        cout << endl;
    }
    return 0;
}
```

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***Instagram Id**: alihassansoomro__*

8. Inverted full pyramid using *

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

Source code

```
#include <iostream>
using namespace std;
int main()
{
    int rows;
    cout << "Enter number of rows: ";
    cin >> rows;

    for(int i = rows; i >= 1; --i)
    {
        for(int space = 0; space < rows-i; ++space)
            cout << "  ";

        for(int j = i; j <= 2*i-1; ++j)
            cout << "* ";

        for(int j = 0; j < i-1; ++j)
            cout << "* ";

        cout << endl;
    }

    return 0;
}
```

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***Instagram Id**: alihassansoomro__*

9. Print Floyd's Triangle.

```
1
2 3
4 5 6
7 8 9 10
```

Source code

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

int main()
{
    int rows, number = 1;

    cout << "Enter number of rows: ";
    cin >> rows;

    for(int i = 1; i <= rows; i++)
    {
        for(int j = 1; j <= i; ++j)
        {
            cout << number << " ";
            ++number;
        }

        cout << endl;
    }

    return 0;
}
```

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BSCS from UBIT, University of Karachi
***Facebook Id**: AliiHassanSoomro*
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***Instagram Id**: alihassansoomro__*

10. Program to print Diamond

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

Source Code

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

int main()
{
    int space, rows;

    cout <<"Enter number of rows: ";
    cin >> rows;

    for(int i = 1, k = 0; i <= rows; ++i, k = 0)
    {
        for(space = 1; space <= rows-i; ++space)
        {
            cout <<"  ";
        }

        while(k != 2*i-1)
        {
            cout << "* ";
            ++k;
```

By: Ali Hassan Soomro
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***Gmail:** alisoomro666@gmail.com*
***Instagram Id**: alihassansoomro__*

```
        }
        cout << endl;

}

    for(int i = rows; i >= 1; --i)
    {
        for(int space = 0; space < rows-i; ++space)
            cout << "  ";

        for(int j = i; j <= 2*i-1; ++j)
            cout << "* ";

        for(int j = 0; j < i-1; ++j)
            cout << "* ";

        cout << endl;
    }

    return 0;
}
```

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***Gmail:** alisoomro666@gmail.com*
***Instagram Id**: alihassansoomro__*

11. C++ Program to Add Two Numbers

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

int main()
{
    int firstNumber, secondNumber, sumOfTwoNumbers;

    cout << "Enter two integers: ";
    cin >> firstNumber >> secondNumber;

    // sum of two numbers in stored in variable sumOfTwoNumbers
    sumOfTwoNumbers = firstNumber + secondNumber;
    // Prints sum
    cout << firstNumber << " + " <<  secondNumber << " = " << sumOfTwoNumbers;
    return 0;
}
```

By: Ali Hassan Soomro
BSCS from UBIT, University of Karachi
***Facebook Id**: AliiHassanSoomro*
***Gmail:** alisoomro666@gmail.com*
***Instagram Id**: alihassansoomro__*

12. Calculate Average of Numbers Using Arrays

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

int main()
{
    int n, i;
    float num[100], sum=0.0, average;

    cout << "Enter the numbers of data: ";
    cin >> n;

    while (n > 100 || n <= 0)
    {
        cout << "Error! number should in range of (1 to 100)." << endl;
        cout << "Enter the number again: ";
        cin >> n;
    }

    for(i = 0; i < n; ++i)
    {
        cout << i + 1 << ". Enter number: ";
        cin >> num[i];
        sum += num[i];
    }

    average = sum / n;
    cout << "Average = " << average;

    return 0;
```

By: Ali Hassan Soomro
BSCS from UBIT, University of Karachi
***Facebook Id**: AliiHassanSoomro*
***Gmail:** alisoomro666@gmail.com*
***Instagram Id**: alihassansoomro__*

13. Find LCM

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

int main()
{
    int n1, n2, max;

    cout << "Enter two numbers: ";
    cin >> n1 >> n2;

    // maximum value between n1 and n2 is stored in max
    max = (n1 > n2) ? n1 : n2;

    do
    {
        if (max % n1 == 0 && max % n2 == 0)
        {
            cout << "LCM = " << max;
            break;
        }
        else
            ++max;
    } while (true);

    return 0;
}
```

By: Ali Hassan Soomro
BSCS from UBIT, University of Karachi
***Facebook Id**: AliiHassanSoomro*
***Gmail:** alisoomro666@gmail.com*
***Instagram Id**: alihassansoomro__*

14. C++Program to Multiply Two Numbers

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

int main()
{
    double firstNumber, secondNumber, productOfTwoNumbers;
    cout << "Enter two numbers: ";

    // Stores two floating point numbers in variable firstNumber and secondNumber
respectively
    cin >> firstNumber >> secondNumber;

    // Performs multiplication and stores the result in variable
productOfTwoNumbers
    productOfTwoNumbers = firstNumber * secondNumber;

    cout << "Product = " << productOfTwoNumbers;

    return 0;
}
```

By: Ali Hassan Soomro
BSCS from UBIT, University of Karachi
***Facebook Id**: AliiHassanSoomro*
***Gmail:** alisoomro666@gmail.com*
***Instagram Id**: alihassansoomro__*

15. C++ Program to Find Largest Number Among Three Numbers

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

int main() {
    float n1, n2, n3;

    cout << "Enter three numbers: ";
    cin >> n1 >> n2 >> n3;

    if(n1 >= n2 && n1 >= n3)
        cout << "Largest number: " << n1;

    if(n2 >= n1 && n2 >= n3)
        cout << "Largest number: " << n2;

    if(n3 >= n1 && n3 >= n2)
        cout << "Largest number: " << n3;

    return 0;
}
```

By: Ali Hassan Soomro
BSCS from UBIT, University of Karachi
***Facebook Id**: AliiHassanSoomro*
***Gmail:** alisoomro666@gmail.com*
***Instagram Id**: alihassansoomro__*

16. C++ Program to Calculate Sum of Natural Numbers

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

int main() {
    int n, sum = 0;

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

    for (int i = 1; i <= n; ++i) {
        sum += i;
    }

    cout << "Sum = " << sum;
    return 0;
}
```

By: Ali Hassan Soomro
BSCS from UBIT, University of Karachi
***Facebook Id**: AliiHassanSoomro*
***Gmail:** alisoomro666@gmail.com*
***Instagram Id**: alihassansoomro__*

17. C++ Program to Convert Binary Number to Decimal and vice-versa

```
#include <iostream>
#include <cmath>

using namespace std;

int convertBinaryToDecimal(long long);

int main()
{
    long long n;

    cout << "Enter a binary number: ";
    cin >> n;

    cout << n << " in binary = " << convertBinaryToDecimal(n) << "in decimal";
    return 0;
}

int convertBinaryToDecimal(long long n)
{
    int decimalNumber = 0, i = 0, remainder;
    while (n!=0)
    {
        remainder = n%10;
        n /= 10;
        decimalNumber += remainder*pow(2,i);
        ++i;
    }
    return decimalNumber;
}
```

By: Ali Hassan Soomro
BSCS from UBIT, University of Karachi
***Facebook Id**: AliiHassanSoomro*
***Gmail:** alisoomro666@gmail.com*
***Instagram Id**: alihassansoomro__*

18. C++ Program to Convert Octal Number to Decimal and vice-versa

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

int octalToDecimal(int octalNumber);

int main()
{
   int octalNumber;
   cout << "Enter an octal number: ";
   cin >> octalNumber;
   cout << octalNumber << " in octal = " << octalToDecimal(octalNumber) << " in
decimal";

   return 0;
}

// Function to convert octal number to decimal
int octalToDecimal(int octalNumber)
{
    int decimalNumber = 0, i = 0, rem;
    while (octalNumber != 0)
    {
        rem = octalNumber % 10;
        octalNumber /= 10;
        decimalNumber += rem * pow(8, i);
        ++i;
    }
    return decimalNumber;
}
```

By: Ali Hassan Soomro
BSCS from UBIT, University of Karachi
***Facebook Id**: AliiHassanSoomro*
***Gmail:** alisoomro666@gmail.com*
***Instagram Id**: alihassansoomro__*

19. C++ program to Reverse a Sentence Using Recursion

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

// function prototype
void reverse(const string& a);

int main() {
  string str;

  cout << " Please enter a string " << endl;
  getline(cin, str);

  // function call
  reverse(str);

  return 0;
}

// function definition
void reverse(const string& str) {

  // store the size of the string
  size_t numOfChars = str.size();

  if(numOfChars == 1) {
    cout << str << endl;
  }
  else {
    cout << str[numOfChars - 1];

    // function recursion
    reverse(str.substr(0, numOfChars - 1));
  }
}
```

By: Ali Hassan Soomro
BSCS from UBIT, University of Karachi
***Facebook Id**: AliiHassanSoomro*
***Gmail:** alisoomro666@gmail.com*
***Instagram Id**: alihassansoomro__*

20. C++ program to Calculate Factorial of a Number Using Recursion

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

int factorial(int n);

int main()
{
    int n;

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

    cout << "Factorial of " << n << " = " << factorial(n);

    return 0;
}

int factorial(int n)
{
    if(n > 1)
        return n * factorial(n - 1);
    else
        return 1;
}
```

By: Ali Hassan Soomro
BSCS from UBIT, University of Karachi
***Facebook Id**: AliiHassanSoomro*
***Gmail:** alisoomro666@gmail.com*
***Instagram Id**: alihassansoomro__*

21. Fibonacci Series up to n number of terms

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

int main() {
    int n, t1 = 0, t2 = 1, nextTerm = 0;

    cout << "Enter the number of terms: ";
    cin >> n;

    cout << "Fibonacci Series: ";

    for (int i = 1; i <= n; ++i) {
        // Prints the first two terms.
        if(i == 1) {
            cout << t1 << ", ";
            continue;
        }
        if(i == 2) {
            cout << t2 << ", ";
            continue;
        }
        nextTerm = t1 + t2;
        t1 = t2;
        t2 = nextTerm;

        cout << nextTerm << ", ";
    }
    return 0;
}
```

By: Ali Hassan Soomro
BSCS from UBIT, University of Karachi
***Facebook Id**: AliiHassanSoomro*
***Gmail:** alisoomro666@gmail.com*
***Instagram Id**: alihassansoomro__*

22. Check if a year is leap year or not

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

int main() {
    int year;

    cout << "Enter a year: ";
    cin >> year;

    if (year % 4 == 0) {
        if (year % 100 == 0) {
            if (year % 400 == 0)
                cout << year << " is a leap year.";
            else
                cout << year << " is not a leap year.";
        }
        else
            cout << year << " is a leap year.";
    }
    else
        cout << year << " is not a leap year.";

    return 0;
}
```

By: Ali Hassan Soomro
BSCS from UBIT, University of Karachi
***Facebook Id**: AliiHassanSoomro*
***Gmail:** alisoomro666@gmail.com*
***Instagram Id**: alihassansoomro__*

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