

Programming problems

Exercise 1 :

Write a C++ program to calculate Fubanaci numbers X_n , $n=1,2, \dots,1000$
 $X_{n+1} = X_n + X_{n-1}$, $X_0=1$, , $X_1=1$, $n=1,2,\dots$

Exercise 2:

Write a C++ program TO REARRANGE A LIST OF RANDOUM
NUMBERS X_n INTO ASCENDING ORDER

Exercise 3:

Write a C++ program to get mean of the degrees of student
(Math = 80 , Science =67, Arabic= 65 , Studies= 88 , English = 56.

Exercise 4:

Write a C++ program to transfer inchs to centimeters (1 inch= 2.54
cintimeters)

Exercise 5:

Use for loop to get the factorials of n positive intergers 1,2,...,1000

Exercise 6 :

Write a C++ program to get the volume and the area of a sphere or radius r

Exercise 7:

Write a C++ program to get the volume and the area of a cylinder of radius
r and height h

Exercise 8:

Write a C++ program to get the sum of the series

$$SUM = 1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \dots + \frac{1}{99} - \frac{1}{100}$$

Exercise 9 :

Write a C++ program to get the sum of the series

$$SUM = 1 - \frac{1}{2!} + \frac{1}{3!} - \frac{1}{4!} + \dots + \frac{1}{99!} - \frac{1}{1000!}$$

Exercise 10:

Write a C++ program to get the sum of the series

$$SUM = 1 - 3^3 + 5^3 - 7^3 + \dots + (-1)^n (2n+1), n = 333$$

Exercise 11:

Write a C++ program to solve the second degree equation

$A X^2 + B X + C = 0$, where the inputs are the coefficients A, B and C

Exercise 12:

Write a C++ program to enter N random values between 0 and 100 and get their mean μ and the standard deviation sd

$$\mu = \frac{\sum_{i=0}^N X_i}{N}, \quad sd = \frac{\sum_{i=0}^{N-1} (X_i - \mu)^2}{N - 1}$$

Exercise 14:

Write a C++ program to enter the elements of the two matrix A and B and their sum and difference where

$$A = \begin{bmatrix} 1 & 2 & 3 \\ -1 & 0 & 3 \\ 7 & 4 & 1 \end{bmatrix} \text{ and } B = \begin{bmatrix} 3 & 1 & 3 \\ -1 & 0 & -2 \\ 0 & 4 & 1 \end{bmatrix}$$

Exercise 15- Write a C++ program to solve the difference equation

$$x_n = \frac{1}{2} \left(x_{n-1} + \frac{2}{x_{n-1}} \right) \quad n \geq 1 \text{ and } x_0 > 0$$

Exercise 16- Write a C++ program to get the result of the multiplication of two matrices

$$A = \begin{bmatrix} 1 & 2 & 3 \\ -1 & 0 & 3 \\ 7 & 4 & 1 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} 3 & 1 & 3 \\ -1 & 0 & -2 \\ 0 & 4 & 1 \end{bmatrix}$$

Exercise 17-

Write a C++ program to calculate the sum of the series $1 - 1/2 + 1/3 + \dots + 1/999$

Exercise 18:

Write a program to convert English units to metric (e.g., miles to kilometers, gallons to liters, etc.). Include a specification and a code design.

Exercise 19:

Write a program to perform date arithmetic, such as how many days there are between 6/1/90 and 8/3/92. Include a specification and a code design.

Exercise 20:

A serial transmission line can transmit 960 characters a second. Write a program that will calculate how long it will take to send a file, given the file's size. Try it on a 400MB (419,430,400 byte) file. Use appropriate units. (A 400MB file takes days.)

Exercise 21:

Write a program to tell whether a number is prime.

Exercise 22:

Write a program that takes a series of numbers and counts the number of positive and negative values.

Exercise 23:

Write a C++ program to solve the second degree equation

$$aX^2 + bX + c = 0 \text{ for any real } a, b \text{ and } c$$

Exercise 24:

Write a c++ program to get the sum of a squarec of odd numbers between 22 and 389

Exercise 25:

Write a C++ program to enter names and degrees of student and give the grades according to the degree

Exercise 26:

Write a C++ program to calculate the area of a triangle with sides a,b and c

*

Solved problems:

Write a C Program to print “Hello, World”

```
#include <iostream.h>
//This program prints "Hello, World".
int main()
{
    cout << "Hello, World.\n";
    return 0;
}
```

Exempl 2 : Write a C Program to print “Hello, World” with sequential output of several strings

```
#include <iostream.h>

//This program illustrates the sequential output of several strings.
int main()
{
    cout << "Hello, " << "Wor" << "ld.\n";
    return 0;
}
```

Exempl 3 : Write a C Program to print “Hello, World” with sequential output of several strings

```
#include <iostream.h>

//This program illustrates the output of strings and characters:
int main()
{
    cout << "Hello, " << 'W' << 'o' << "r" << "ld" << '!' << "\n";
    return 0;
}
```

Exempl 4 : Write a C Program to test the function strlen()

```
#include <iostream.h>
#include <string.h>

//This program tests the strlen() function:
```

```

int main()
{
    cout << strlen("Hello, World.\n") << '\n';
    cout << strlen("Hello, World.") << '\n';
    cout << strlen("Hello, ") << '\n';
    cout << strlen("H") << '\n';
    cout << strlen("") << '\n';
    return 0;
}

```

Exempl 5 : Write a C Program to demonstrate comments

```

#include <iostream.h>    // This directive is needed to use cout
//This prints message: "Hello, World:".
int main()
{
    cout << /* now printing */ "Hello, World.\n"; /* change/* ?
    return 0; // Some compilers will complain if you omit this line
    /* {end of program/*
}

```

Exempl 6 : Write a C Program to demonstrate assignment

```

<iostream.h>
//A simple example to illustrate assignment:
int main()
{
    int n;
    n = 66;
    cout << n << endl;
    return 0;
}

```

Exempl 7 : Write a C Program to demonstrate variable declarations

```

#include <iostream.h>
//This program illustrates variable declarations:
int main()
{
    int x, y1; // declares the variables x and y1
    x = 77;
    y1 = 88;
    int y2 = 55; // declares the variable y2, initializing it to 55
}

```

```

    cout << x << ", " << y1 << ", " << y2 << endl;
    return 0;
}

```

Example 8 : Write a C Program to illustrate tokens

```

#include <iostream.h>

//A simple program to illustrate tokens:
int main()
{
    int n = 66;
    cout << n << endl;
    return 0;
}

```

Example 8 : Write a C Program to initialize variable as they are declared

```

#include <iostream.h>

//This shows how to initialize variable as they are declared:
int main()
{
    int num1 = 44;
    int num2 = 33;
    int sum = num1 + num2;
    cout << george << " + " << martha << " = " << sum << endl;
    return 0;
}

```

Example 9 : Write a C Program to initialize variable as they are declared

```

//This shows how to initialize variables as they are declared:
int main()
{
    int n1, n2 = 55, n3, n4, n5 = 44, n6;
    cout << n2 << ", " << n5 << endl;
    return 0;
}

```

Example 9 : Write a C Program to demonstrate assignment

```

#include <iostream.h>
//This shows that an assignment can be part of a larger expression:

```

```

int main()
{
    int m, n;
    m = (n = 66) + 9; // (n = 66) is an assignment expression
    cout << m << ", " << n << endl;
    return 0;
}

```

Example 10: Write a C Program to test arithmetic operators

```

#include <iostream.h>
//Tests arithmetic operators:
int main()
{
    int m = 38, n = 5;
    cout << m << " + " << n << " = " << (m + n) << endl;
    cout << m << " - " << n << " = " << (m - n) << endl;
    cout << " - " << n << " = " << (-n) << endl;
    cout << m << " * " << n << " = " << (m * n) << endl;
    cout << m << " / " << n << " = " << (m / n) << endl;
    cout << m << " % " << n << " = " << (m % n) << endl;
    return 0;
}

```

Example 11 : Write a C Program to test quotient and remainder operators

```

#include <iostream.h>

//Tests quotient and remainder operators:
int main()
{
    int m = -14, n = 5, q = m/n, r = m%n;
    cout << "m = " << m << endl;
    cout << "n = " << n << endl;
    cout << "q = " << q << endl;
    cout << "r = " << r << endl;
    cout << "q*n + r = " << "(" << q << ")*(" << n << " + (" >>
    >> r << " = " << q*n + r << " = " << m << endl;
    return 0;
}

```

Example 12 : Write a C Program to test the increment and decrement operators

```

#include <iostream.h>

//Tests the increment and decrement operators:
int main()
{
    int m = 44, n = 66;
    cout << "m = " << m << ", n = " << n << endl;
    ++ m;
    -- n;
    cout << "m = " << m << ", n = " << n << endl;
    m++;
    n--;
    cout << "m = " << m << ", n = " << n << endl;
    return 0;
}

```

Example 13 : Write a C Program to test the increment and decrement operators

```

#include <iostream.h>

//Tests the increment and decrement operators:
int main()
{
    int m = 66, n;
    n = ++m;
    cout << "m = " << m << ", n = " << n << endl;
    n = m++;
    cout << "m = " << m << ", n = " << n << endl;
    cout << "m = " << m++ << endl;
    cout << "m = " << m << endl;
    cout << "m = " << ++m << endl;
    return 0;
}

```

Example 13 : Write a C Program to test the increment and decrement operators

```

#include <iostream.h>
int main()
{
    int n = 5, x;
    x = ++n * --n;
    cout << "n = " << n << ", x = " << x << endl;
}

```



```

cout << ++n << " " << ++n << " " << ++n << endl;
return 0;
}

```

Example 13 : Write a C Program to test the increment and decrement operators

```
#include <iostream.h>
```

```

//Tests combined operators:
int main()
{
int n = 44;
n +=9;
cout << n << endl;
n -= 5;
cout << n << endl;
n *= 2;
cout << n << endl;
return 0;
}

```

Example 13 : Write a C Program to test output of type char

```
#include <iostream.h>
```

```

//Tests output of type char:
int main()
{
char c = 64;
cout << c++ << " "; // prints '@' and increments c to 65
cout << c++ << " "; // prints 'A' and increments c to 66
cout << c++ << " "; // prints 'B' and increments c to 67
cout << c++ << endl; // prints 'C' and increments c to 68
c = 96;
cout << c++ << " "; // prints '^' and increments c to 97
cout << c++ << " "; // prints 'a' and increments c to 98
cout << c++ << " "; // prints 'b' and increments c to 99
cout << c++ << endl; // prints 'c' and increments c to 100
return 0;
}

```

Example 13 : Write a C Program to test output of type char

```
#include <iostream.h>
```

```

//Tests output of type char:
int main()
{
    char c = 'A';
    cout << c++ << " " << int(c) << endl;    // prints 'A' and 65
    cout << c++ << " " << int(c) << endl;    // prints 'B' and 66
    cout << c++ << " " << int(c) << endl;    // prints 'C' and 67
    return 0;
}

```

Example 13 : Write a C Program to Print sum, difference, product, and quotient of given integers:

```

#include <iostream.h>
//Prints sum, difference, product, and quotient of given integers:
int main()
{
    int m = 60, n = 7;
    cout << "The integers are " << m << " and " << n << endl;
    cout << "Their sum is      " << (m + n) << endl;
    cout << "Their difference is " << (m - n) << endl;
    cout << "Their product is   " << (m * n) << endl;
    cout << "Their quotient is  " << (m / n) << endl;
    cout << "Their remainder is " << (m % n) << endl;
    return 0;
}

```

Example 13 : Write a C Program to Print the block letter "B" in a 7 x 6 grid.
#include <iostream.h>

```

//Prints the block letter "B" in a 7 x 6 grid:
int main()
{
    cout << "*****" << endl;
    cout << "*   *" << endl;
    cout << "*   *" << endl;
    cout << "*****" << endl;
    cout << "*   *" << endl;
    cout << "*   *" << endl;
    cout << "*****" << endl;
    return 0;
}

```

Example 13 : Write a C Program to Print the block letter "B" in a 7 x 6 grid

```
#include <iostream.h>
int main()
{
    int age;
    cout << "How old are you" ;;
    cin >> age;
    cout << "In 10 years, you will be " << age + 10 << ".\n";
    return 0;
}
```

//Example 2.2, page 32

//Schaum's Outline of Programming with C++ by John R. Hubbard

//Copyright McGraw-Hill, 1996

```
#include <iostream.h>
```

```
int main()
{
    char first, last;
    cout << "Enter your initials:\n";
    cout << "\tFirst name initial" ;;
    cin >> first;
    cout << "\tLast name initial" ;;
    cin >> last;
    cout << "Hello, " << first << ". " << last << ".!\n";
    return 0;
}
```

Example 13 : Write a C Program to Print the block letter "B" in a 7 x 6 grid

```
#include <iostream.h>
int main()
{
    char first, last;
    cout << "Enter your first and last initials" ;;
    cin >> first >> last;
    cout << "Hello, " << first << ". " << last << ".!\n";
    return 0;
}
```

Example 13 : Write a C Program to Print the block letter "B" in a 7 x 6 grid

```
#include <iostream.h>
```

```

int main()
{
    int n, d;
    cout << "Enter two integers" ::;
    cin >> n >> d;
    if (n%d == 0) cout << n << " is divisible by " << d << endl;
    return 0;
}

```

Example 13 : Write a C Program to Print the block letter "B" in a 7 x 6 grid

```
#include <iostream.h>
```

```

int main()
{
    int n, d;
    cout << "Enter two integers" ::;
    cin >> n >> d;
    if (n%d == 0) cout << n << " is divisible by " << d << endl;
    else cout << n << " is not divisible by " << d << endl;
    return 0;
}

```

//Example 13 : Write a C Program to Print the block letter "B" in a 7 x 6 grid

```
#include <iostream.h>
```

```

int main()
{
    int n, d;
    cout << "Enter two integers" ::;
    cin >> n >> d;
    if (n%d) cout << n << " is not divisible by " << d << endl;
    else cout << n << " is not divisible by " << d << endl;
    return 0;
}

```

Example 13 : Write a C Program to Print the block letter "B" in a 7 x 6 grid

```
#include <iostream.h>
```

```
int main()
```

```

{
int n1, n2, n3;
cout << "Enter three integers" ::;
cin >> n1 >> n2 >> n3;
int max = n1;
if (n2 > max) max = n2;
if (n3 > max) max = n3;
cout << "The maximum is " << max << endl;
return 0;
}

```

Example 13 : Write a C Program to Print the block letter "B" in a 7 x 6 grid

```

#include <iostream.h>

int main()
{
int a, b, c;
cout << "Enter three integers" ::;
cin >> a >> b >> c;
if (a >= b && a >= c) cout << a << endl;
if (b >= a && b >= c) cout << b << endl;
if (c >= a && c >= b) cout << c << endl;
return 0;
}

```

Example 13 : Write a C Program to Print the block letter "B" in a 7 x 6 grid

```

#include <iostream.h>

int main()
{
char ans;
cout << "Are you enrolled (y/n" :(;
cin >> ans;
if (ans == 'Y' || ans == 'y') cout << "You are enrolled.\n";
else cout << "You are not enrolled.\n";
return 0;
}

```

Example 13 : Write a C Program to Print the block letter "B" in a 7 x 6 grid

```

#include <iostream.h>
int main()

```

```

{
int a, b, c, max;
cout << "Enter three integers" ;;
cin >> a >> b >> c;
if (a > b(
    if (a > c) max = a;    // a > b and a > c
    else max = c;        // c >= a > b
else
    if (b > c) max = b;    // b >= a and b > c
    else max = c;        // c >= b >= a
cout << "The maximum is " << max << endl;
return 0;
}

```

Example 13 : Write a C Program to Print the block letter "B" in a 7 x 6 grid

```

#include <iostream.h>

int main()
{
int score;
cout << "Enter the test score" ;;
cin >> score;
if (score > 100) cout << "Error: score is out of range".;
else if (score >= 90) cout << 'A';
else if (score >= 80) cout << 'B';
else if (score >= 70) cout << 'C';
else if (score >= 60) cout << 'D';
else if (score >= 0) cout << 'F';
else cout << "Error: score is out of range".;
return 0;
}

```

Example 13 : Write a C Program to Print the block letter "B" in a 7 x 6 grid

```

#include <iostream.h>

int main()
{
int score;
cout << "Enter the test score: "; cin >> score;
switch (score/10) {
case 10:

```

```

    case 9: cout << 'A' << endl; break;
    case 8: cout << 'B' << endl; break;
    case 7: cout << 'C' << endl; break;
    case 6: cout << 'D' << endl; break;
    case 5 :
    case 4 :
    case 3 :
    case 2 :
    case 1 :
    case 0: cout << 'F' << endl; break;
    default: cout << "Error: score is out of range.\n";
}
return 0;
}

```

Example 13 : Write a C Program to Print the block letter "B" in a 7 x 6 grid

```

#include <iostream.h>
enum Color {red, orange, yellow, green, blue, violet};
int main()
}
Color x = blue;
cout << "x = " << x << endl;
return 0;
}

```

Example : Write a C Program to Solve solves quadratic equation

```

#include <iostream.h>
#include <math.h> // needed for the sqrt() function

//This solves the equation a*x*x + b*x + c == 0:
int main()
{
float a, b, c;
cout << "Enter coefficients of quadratic equation" ::;
cin >> a >> b >> c;
if (a == 0){
cout << "This is not a quadratic equation: a == 0\n";
return 0;
}
cout << "The equation is: " << a << "x^2 + " << b
<<"x + " << c << " = 0\n";
double d, x1, x2;
d = b*b - 4*a*c; // the discriminant
if (d < 0){

```

```

    cout << "This equation has no real solutions: d < 0\n";
    return 0;
}
x1 = (-b + sqrt(d))/(2*a);
x2 = (-b - sqrt(d))/(2*a);
cout << "The solutions are: " << x1 << ", " << x2 << endl;
return 0;
}

```

Example : Write a C Program to Solve solves quadratic equation

```

#include <iostream.h>

```

```

int main()
{
    int i = 1, n, sum = 0;
    cout << "Enter a positive integer: "; cin >> n;
    while (i <= n){
        sum += i*i;
        i++ ;
    }
    cout << "The sum of the first " << n << " squares is "
<<sum << endl;
    return 0;
}

```

```

int #include <iostream.h<

```

```

main()
{
    int n, f = 1;
    cout << "Enter a positive integer: "; cin >> n;
    cout << n << " factorial is ";
    do {
        f *= n;
        n--;
        while (n > 1);{
    cout << f << endl;
    return 0;
}
}

```


Example To calculate factorial function

```
#include <iostream.h>

int main()
{
    int n, f = 1;
    cout << "Enter a positive integer: "; cin >> n;
    for (int i = 2; i <= n; i++)
        f *= i;
    cout << n << " factorial is " << f << endl;
    return 0;
}
```

Example : Write a C Program to make calendar

```
#include <iostream.h>
void printDate(int, int, int);
int main()
{
    int month, day, year;
    do {
        cin >> month >> day >> year;
        printDate(month, day, year);
    } while (month > 0);
    return 0;
}

void printDate(int m, int d, int y)
{
    if (m < 1 || m > 12 || d < 1 || d > 31 || y < 0){
        cout << "Error: parameter out of range.\n";
        return;
    }
    switch (m) {
        case 1: cout << "January "; break;
        case 2: cout << "February "; break;
        case 3: cout << "March "; break;
        case 4: cout << "April "; break;
        case 5: cout << "May "; break;
        case 6: cout << "June "; break;
        case 7: cout << "July "; break;
        case 8: cout << "August "; break;
```

```

    case 9: cout << "September "; break;
    case 10: cout << "October "; break;
    case 11: cout << "November "; break;
    case 12: cout << "December "; break;
}
cout << d << ", " << y << endl;
}

```

Example : Write a C Program to get the area of circle

```

#include <iostream.h>
void computeCircle(double&, double&, double);
int main()
{
    double r, a, c;
    cout << "Enter radius" ;;
    cin >> r;
    computeCircle(a, c, r);
    cout << "area = " << a << ", circumference = " << c << endl;
    return 0;
}

```