1. Menu Driven Calculator (Addition, Subtraction, Multiplication, Division)

```cpp
#include <iostream>
using namespace std;
int main() {
    int choice;
    double num1, num2;
    cout << "\n=== Simple Calculator ===\n";
    cout << "1. Addition\n";
    cout << "2. Subtraction\n";
    cout << "3. Multiplication\n";
    cout << "4. Division\n";
    cout << "Enter your choice (1-4): ";
    cin >> choice;
    cout << "Enter first number: ";
    cin >> num1;
    cout << "Enter second number: ";
    cin >> num2;
    if (choice == 1) {
        cout << num1 << " + " << num2 << " = " << (num1 + num2) << endl;
    }
    else if (choice == 2) {
        cout << num1 << " - " << num2 << " = " << (num1 - num2) << endl;
    }
    else if (choice == 3) {
        cout << num1 << " * " << num2 << " = " << (num1 * num2) << endl;
    }
    else if (choice == 4) {
        if (num2 != 0) {
            cout << num1 << " / " << num2 << " = " << (num1 / num2) << endl;
        } else {
            cout << "Error! Division by zero is not allowed." << endl;
```

```cpp
        }
    }
    else {
        cout << "Invalid choice! Please select 1, 2, 3 or 4." << endl;
    }
    return 0;
}
```

```
=== Simple Calculator ===
1. Addition
2. Subtraction
3. Multiplication
4. Division
Enter your choice (1-4): 4
Enter first number: 3
Enter second number: 5
3 / 5 = 0.6

[Program finished]
```

2. Maximum and Minimum of Three Numbers

```cpp
#include <iostream>
using namespace std;
int main() {
    int a, b, c;
    cout << "Enter three numbers: ";
    cin >> a >> b >> c;
    int max = a;
    int min = a;
    if (b > max) max = b;
    if (c > max) max = c;
    if (b < min) min = b;
    if (c < min) min = c;
    cout << "Maximum = " << max << endl;
    cout << "Minimum = " << min << endl;
    return 0;
}
```

```
Enter three numbers: 2 3 4
Maximum = 4
Minimum = 2

[Program finished]
```

3. Mathematical Expressions – Area & Volume of Shapes

```cpp
#include <iostream>

#include <cmath>

using namespace std;

int main() {

    int choice;

    double length, width, radius, height, area, volume;

    cout << "\nChoose shape:\n";

    cout << "1. Area of Rectangle\n";

    cout << "2. Area of Circle\n";

    cout << "3. Volume of Cylinder\n";

    cout << "Enter choice (1-3): ";

    cin >> choice;

    if (choice == 1) {

        cout << "Enter length: ";

        cin >> length;

        cout << "Enter width: ";

        cin >> width;

        area = length * width;

        cout << "Area of rectangle = " << area << endl;

    }

    else if (choice == 2) {

        cout << "Enter radius: ";

        cin >> radius;

        area = 3.14159 * pow(radius, 2);  // π r²

        cout << "Area of circle = " << area << endl;

    }

    else if (choice == 3) {
```

```cpp
        cout << "Enter radius: ";

        cin >> radius;

        cout << "Enter height: ";

        cin >> height;

        volume = 3.14159 * pow(radius, 2) * height;   // π r² h

        cout << "Volume of cylinder = " << volume << endl;

    }

    else {

        cout << "Wrong choice!" << endl;

    }

    return 0;

}
```

```
Choose shape:
1. Area of Rectangle
2. Area of Circle
3. Volume of Cylinder
Enter choice (1-3): 3
Enter radius: 2
Enter height: 3
Volume of cylinder = 37.6991

[Program finished]
```

```
Choose shape:
1. Area of Rectangle
2. Area of Circle
3. Volume of Cylinder
Enter choice (1-3): 1
Enter length: 2
Enter width: 4
Area of rectangle = 8

[Program finished]
```

4. Compound Interest Calculation

```cpp
#include <iostream>

#include <cmath>   // needed for pow()

using namespace std;

int main() {

    double principal, rate, time, amount, compoundInterest;

    cout << "Enter principal amount: ";

    cin >> principal;

    cout << "Enter annual interest rate (in %): ";

    cin >> rate;

    cout << "Enter time (in years): ";

    cin >> time;

    amount = principal * pow(1 + rate/100, time);

    compoundInterest = amount - principal;
```

```cpp
    cout << "\nFinal Amount     = " << amount << endl;

    cout << "Compound Interest = " << compoundInterest << endl;

    return 0;

}
```

```
Enter principal amount: 2000
Enter annual interest rate (in %): 20
Enter time (in years): 2

Final Amount = 2880
Compound Interest = 880

[Program finished]
```

5. Maximum of Two Numbers

```cpp
#include <iostream>

using namespace std;

int main() {

    int a, b;

    cout << "Enter two numbers: ";

    cin >> a >> b;

    if (a > b) {

        cout << a << " is maximum" << endl;

    } else if (b > a) {

        cout << b << " is maximum" << endl;

    } else {

        cout << "Both numbers are equal" << endl;

    }

    return 0;

}
```

```
Enter two numbers: 2 3
3 is maximum

[Program finished]
```

6. Maximum of Three Numbers

```cpp
#include <iostream>

using namespace std;
```

```cpp
int main() {

    int a, b, c;

    cout << "Enter three numbers: ";

    cin >> a >> b >> c;

    if (a >= b && a >= c) {

        cout << a << " is the maximum" << endl;

    }

    else if (b >= a && b >= c) {

        cout << b << " is the maximum" << endl;

    }

    else {

        cout << c << " is the maximum" << endl;

    }

    return 0;

}
```
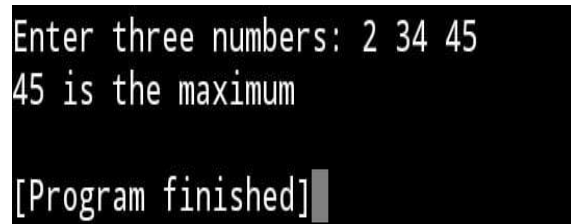
```
Enter three numbers: 2 34 45
45 is the maximum

[Program finished]
```

8. Roots of Quadratic Equation ($ax^2 + bx + c = 0$)

```cpp
#include <iostream>

#include <cmath>   // for sqrt()

using namespace std;

int main() {

    double a, b, c, discriminant, root1, root2;


    cout << "Enter coefficients a, b, c: ";

    cin >> a >> b >> c;


    if (a == 0) {

        cout << "Not a quadratic equation!" << endl;
```

```cpp
        return 0;

    }


    discriminant = b*b - 4*a*c;

    if (discriminant > 0) {

        root1 = (-b + sqrt(discriminant)) / (2*a);

        root2 = (-b - sqrt(discriminant)) / (2*a);

        cout << "Two real roots:" << endl;

        cout << "Root 1 = " << root1 << endl;

        cout << "Root 2 = " << root2 << endl;

    }
    else if (discriminant == 0) {

        root1 = -b / (2*a);

        cout << "One real root (repeated): " << root1 << endl;

    }
    else {

        double real = -b / (2*a);

        double imag = sqrt(-discriminant) / (2*a);

        cout << "Two complex roots:" << endl;

        cout << "Root 1 = " << real << " + " << imag << "i" << endl;

        cout << "Root 2 = " << real << " - " << imag << "i" << endl;

    }
    return 0;

}
```

```
Enter coefficients a, b, c: 1 2 3
Two complex roots:
Root 1 = -1 + 1.41421i
Root 2 = -1 - 1.41421i

[Program finished]
```

7. Grade Letter Based on Marks

```cpp
#include <iostream>

using namespace std;

int main() {
```

```cpp
    int marks;

    cout << "Enter your marks (0-100): ";

    cin >> marks;

    if (marks < 0 || marks > 100) {

        cout << "Invalid marks! Please enter between 0 and 100." << endl;

        return 0;

    }

    int gradeGroup = marks / 10;

    cout << "Your Grade: ";

    switch (gradeGroup) {

        case 10:   cout<<"O"<<endl;

            break;

        case 9:

            cout << "A+" << endl;

            break;

        case 8:

            cout << "A" << endl;

            break;

        case 7:

            cout << "B+" << endl;

            break;

        case 6:

            cout << "B" << endl;

            break;

        case 5:

            cout << "C" << endl;

            break;

        case 4:

            cout << "D" << endl;

            break;

        default:
```

```cpp
            cout << "F (Fail)" << endl;

            break;

    }

    return 0;

}
```

```
Enter your marks (0-100): 19
Your Grade: F (Fail)

[Program finished]
```