Introduction to C++ Programming

First program

```
1
2  #include <iostream>
3  using namespace std;
4
5  int main() {
6  // first program
7  cout << "hello world"  ;
8
9  }
```

#include <iostream>

- **What it means:**

Tells the compiler to include the **iostream** library.

This gives us access to cout, cin, and other input/output features.

- **Think of it as:**

Borrowing a toolbox before starting work — without it, we can’t use cout.

- **Mandatory or Optional?**

Mandatory if you want to use cout or cin.

Can be skipped if your program doesn’t do input/output.

`using namespace std;`

- **What it means:**

Tells the compiler that we are going to use everything from the **std (standard)** namespace **without writing `std::` every time**.

- **Think of it as:**

Setting a shortcut — now you can call `cout` directly instead of typing `std::cout`.

- **Mandatory or Optional?**

Optional — without this line, you must write `std::cout` and `std::cin`.

Good for small beginner programs (makes code shorter and easier).

`int main() {}`

•**What it means:**

This is the **main function**.

Every C++ program **must have one** — this is where the program starts running.

•**Mandatory or Optional?**

Mandatory — a C++ program won't run without a `main()` function.

//first program

•**What it means:**
This is a **comment** — just a note for humans.
The computer ignores it completely.

•Types of Comments:
•Single-Line Comment: Starts with **//**

•Multi-Line Comment: Starts with **/*** and ends with ***/**

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

int main() {
    /* This is a multi-line comment.
       It can go on for multiple lines.
       The compiler ignores all of it. */
    cout << "Hello World!";
    return 0;
}
```

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

int main() {
    int age = 22; // This is a single-line comment
    cout << age;  // Prints the value of age
    return 0;
}
```

cout

- It belongs to the **iostream library**.
- Works with the **insertion operator (<<)** to send data **from variables → to the screen**.
- Can display **text, numbers, or both together**.
- Supports **single output** (cout << x;) or **multiple outputs** (cout << x << y << z;).

" " vs ' '

- " " = string (many characters)
- ' ' = single character (exactly one, like `'A'`)

```
1
2  #include <iostream>
3  using namespace std;
4  int main() {
5  // first program
6  cout << '#'   ;
7
8  }
```

```
1
2  #include <iostream>
3  using namespace std;
4  int main() {
5  // first program
6  cout << 2025   ;
7
8  }
```

`return 0;`

What it means:

This tells the computer **“the program finished successfully.”**

Returning `0` means there were no errors.

Mandatory or Optional?

Optional in modern C++ — if you skip it, the compiler automatically assumes `return 0;`.

Task:

```
std::cout << "Hello\nWorld";

std::cout << "Name \t Age\nmariam \t 16";

std::cout << "She said \"Hi\""

std::cout << "C:\\Path"
```

Escape Code	What It Does	Example Output
`\n`	New line	`Hello\nWorld` → prints on two lines
`\t`	Tab space	`A\tB` → A B
`\"`	Double quote inside string	`"She said \"Hi\""` → She said "Hi"
`\\`	Backslash	`"C:\\Path"` → C:\Path

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

int main() {
    int number;
    cout << "Enter one number: ";
    cin >> number;  // take a single input
    cout << "You entered: " << number;
    return 0;
}
```

Cin:

- It belongs to the **iostream library**.
- Works with the **extraction operator (>>)** to move data **from keyboard → into variables**.
- Supports **single input** (cin >> x;) or **multiple inputs** (cin >> x >> y >> z;).
- Reads input until a **space or Enter** is pressed.

Problem solving:

1.Ask the user to enter their name, then print a greeting message.

2. Store a person’s age and city in variables, then print both values in one sentence.

3.Ask the user to enter two numbers, then display their sum.

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

int main() {
    string name;
    cout << "Enter your name: ";
    cin >> name;  // input one word
    cout << "Hello " << name;
    return 0;
}
```

cpp

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

int main() {
    int age = 18;
    string city = "Cairo";
    cout << "Age: " << age << ", City: " << city;
    return 0;
}
```

cpp

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

int main() {
    int a, b;
    cout << "Enter two numbers: ";
    cin >> a >> b;   // take two inputs
    cout << "The sum is: " << a + b;
    return 0;
}
```