Lecture Summary

Anatomy of your first C++ program

Recall the following simple program from first week lectures that demonstrates the basic structure of a C++ program, including libraries, defining the main function, and using the `cout` object for output.

```
#include <iostream>
int main()
{
    std::cout << "Hello, World!" << std::endl;
    return 0;
}
```

Now, let's break down the different parts of this program to make it understandable:

- **`#include`** `<iostream>`: This line is a preprocessor directive that tells the compiler to include the `iostream` library. The `iostream` library provides functionality for input and output operations, like printing text to the screen.
- **`int`** `main(){ ... }`: This is the `main` function of your program. Every C++ program must have a `main` function. The program's execution starts from here.
- `std::cout << "Hello, World!"<< std::endl;`: This line uses the cout object from the iostream library to print text to the console. `std::cout` is used to output data to the console, and « is the insertion operator that "inserts" the text or value on its right into the output stream. "Hello, World!"is the text you want to print. `std::endl` is used to insert a newline character and flush the output buffer.
- **`return`** `0;`: This line indicates the end of the `main` function and the successful termination of the program. The value 0 is returned to the operating system, signifying that the program ran without errors.

When you compile and run this program, you'll see the output: `Hello, World!`

Declaring a Variable

In C++, a variable is a named location in memory that stores a value. Before using a variable, you need to declare it, which involves specifying the variable's data type and a name. Here's the general syntax:

```
data_type variable_name;
```

For example, to declare an integer variable named `age`:

```
int age;
```

Assigning a Value to a Variable

After declaring a variable, you can assign a value to it using the assignment operator =. The value you assign should match the variable's data type. Here's an example:

```
age = 25;
```

Output using cout

`cin` and `cout` are part of the C++ Standard Library and are used for input and output operations. cin is used for input (reading values from the user), and cout is used for output (displaying values to the user).

Output using cout: To display output to the user, you use cout along with the « operator. You can output variables, constants, and text. Here's an example:

```
cout << "Your age is: " << age << endl;
```

Using Escape Character

Indicates "special" character output listed in the table below

Escape Sequence	Description
\n	Newline. Position the screen cursor to the beginning of the next line.
\t	Horizontal tab. Move the screen cursor to the next tab stop.
\r	Carriage return. Position the screen cursor to the beginning of the current line; do not advance to the next line.
\a	Alert. Sound the system bell.
****	Backslash. Used to print a backslash character.
\"	Double quote. Used to print a double quote character.

Lab Questions

1. Write a program that prints your household grocery list consisting of as many items as you need. Use '\n' to print each item of the list on a new line.

```
Household Grocery List:
1. Milk
2. Eggs
3. Bread
4. Rice
5. Apples
6. Chicken
7. Vegetables
8. Coffee
```

2. Write a program that creates and displays a table with four columns: Name, Age, Gender, and Height. The program should use \t for proper alignment and \n to move between rows. You need to display at least three entries in the table.

```
Name            Age     Gender  Height
-----------------------------------------
John Doe        18      M       5.9
Jane Smith      20      F       5.6
Emily Davis     22      F       5.7
```

3. Write a program that creates and displays a table consisting of a list of students and their ITP scores in a tabular format. The program should use \t for proper alignment and \n to move between rows. You need to display at least three entries in the table. Note: Formatting of the code is all up to you.

```
Student Name    ITP Score
-------------------------------
Alice Johnson   85
Bob Smith       90
Charlie Brown   78
```

4. Write a program that initializes an integer variable with a user's age and then prints a message that includes this age. The message should be of the format: "You are [Age] years old."

   Requirements:

   - Declare an int variable and initialize it with the user's age.
   - Use cout to print a message in the format: "You are [Age] years old."

5. Write a C++ program that initializes two integer variables representing the length and width of a rectangle. The program should then calculate the area of the rectangle and print a message in the format: "The area of the rectangle is [Area] square units."