

The American University in Cairo
Computer Science & Engineering Department
CSCE 106 – Fundamentals of Computer Science

Lab Session 2

Arithmetic Expressions & Operations

Objectives:

- To become more familiar with the general C++ program and its basic elements.
- To understand the use of data types and the differences between the numeric types for real numbers and integers.
- To understand how to write assignment statements to change the values of variables.
- To learn how C++ evaluates arithmetic expressions and how to write them.
- To learn how to use the standard mathematical library `<cmath>`.
- To understand the differences between syntax errors, run-time errors, and logic errors and how to avoid them and to correct them.

Problems:

Write a C++ program or each of the following problems:

1. Write a C++ program to enter length and width of a rectangle, compute and print the area and perimeter of the rectangle. Print both rounded to the nearest tenth of a foot.
2. Write a program to compute the cost for carpeting a room. Input should consist of the room length (in meters), room width (in meters), and carpet price per square meter.
3. Compute and print the number of minutes in a year.
4. Given a positive number, print its square and square root.
5. Write a C++ program to take a depth (in kilometers) inside the earth as input data; compute and display the temperature at that depth in degrees Celsius and Fahrenheit. The relevant formulas are:

Celsius = $10 \times (\text{depth}) + 20$ (Celsius temperature at depth in km)

Fahrenheit = $1.8 \times (\text{Celsius}) + 32$

6. The Pythagorean Theorem states that the sum of the squares of the sides of a right triangle is equal to the square of the hypotenuse. For example, if two sides of a right triangle have lengths 3 and 4, then the hypotenuse must have a length of 5. The integers 3, 4, and 5 together form a Pythagorean triple. There is an infinite number of such triples. Given two positive integers, m and n, where $m > n$, a Pythagorean triple can be generated by the following formulas:

Side1 = $m^2 - n^2$

Side2 = $2mn$

Hypotenuse = square root of $(\text{side1}^2 + \text{side2}^2)$

Instructions:

- The TA solves problem 1 (**20 minutes**)
- The TA asks students to solve and **submit in-Lab** problem 2 (**40 minutes**)
- The TA asks students to solve the other problems and **submit in the next Lab session**.