Module 24: Problem Solving with Functions

Intro to Computer Science 1 - C++

Professor Scott Frees

Textbook

Design with functions is discussed in section 6.15 of the textbook

Top Down Design

Use Abstraction to solve problems

- Mimic's the way you actually think about things…
- Try to never solve (program) a complex task - always break it into sub tasks (functions)
- You will eventually break down the program into small pieces that require "little" thought…

Programming Example 28

- Write a program that accepts temperatures in either C or F
  - Outputs the temperature in both C and F
  - 5 Functions:
    - Get C or F from user
    - Get Temperature from user
    - Function to convert from C and to C
    - Function to output results

$C = 5/9(F-32)$

$F = C(9/5) + 32$

Lab 09

The quadratic formula takes coefficients a, b, and c and determines the roots of the polynomial equation

$ax^2 + bx + c = 0$

The quadratic formula is as follows:

$$r1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a} \quad \text{and} \quad r2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

1. For coefficients where b2 - 4ac is negative, there are *no roots*.
2. For some coefficients, the value of r1 and r2 will be the same (one root)
3. For others, there will be 2 distinct roots.

Lab 09

Write a program that asks the user for a, b, and c.

Implement a function called quad

```
int quad(double a, double b, double c, double &r1, double &r2)
```

- Return the number of roots.
- r1 should have the first root (if applicable)
- r2 should have the second root (if applicable)