Anlysis and Design

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Notes

Analysis and Design

Quadratic Equation Solver
- Problem
- Analysis
- Design

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Problem

- Write a program that calculates the roots of a quadratic equation

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Analysis

- Where do we start?
- What is a quadratic equation?

$$ax^2 + bx + c = 0$$

  - What happens when $a = 0$?

$$bx + c = 0$$

  - What happens when $a = 0$, $b = 0$, and $c! = 0$?

$$c = 0$$

however,

$$c \neq 0$$

so there is

No Solution

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Analysis

- If we have a quadratic equation of the form

$$ax^2 + bx + c = 0$$

- We can solve for the roots by using the quadratic equation

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

- The discriminant of a quadratic $d = b^2 - 4ac$ reveals what type of roots the equation has:
  - $d > 0$ two real roots
  - $d = 0$ one real root
  - $d < 0$ two imaginary roots

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Design

- How does the program flow?
  - Get values of a, b, and c from standard input
  - Determine whether the input coefficients constitutes a quadratic equation, linear equation, or an equation with no solution
  - Direct program flow to a part of system that solves the respective equation
  - For the quadratic equation part, need subparts that deal with positive, negative, and zero valued discriminants, along with means to direct program flow to the respective subpart
  - Print the result to standard output

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Design: Flowchart

- Let's create a flowchart that details the program flow of our quadratic equation solver

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