

# Analysis and Design

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## Quadratic Equation Solver

Problem

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

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

- ▶ What happens when  $a = 0$ ?

$$bx + c = 0$$

- ▶ What happens when  $a = 0$ ,  $b = 0$ , and  $c \neq 0$ ?

$$c = 0$$

however,

$$c \neq 0$$

so there is

No Solution

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- ▶ 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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  - ▶ 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

# Design: Flowchart

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