

Quadratic Formula Design

Major Task: Solve for roots

Variables:

| | | | |
|---------------|-----------------------|----------|----------|
| double aValue | double disc | double y | double g |
| double bValue | double x ₁ | double z | |
| double cValue | double x ₂ | double f | |

Minor Tasks:

Finding to use quadratic or linear equation input.

if $a = 0$

$$x_1 = (-cValue) / (bValue)$$

$x_2 = \text{NaN}$

if $a \neq 0$

Solve using quadratic formula

$$x_1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$$

$$x_2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

Finding the discriminant

$$\text{disc} = (bValue)^2 - (4)(aValue)(cValue)$$

if $\text{disc} < 0$

$$x_1 = \frac{-b}{2a} + \left(\frac{\sqrt{\text{abs}(\text{disc})}}{2a} \right) "i"$$

$$x_2 = \frac{-b}{2a} - \left(\frac{\sqrt{\text{abs}(\text{disc})}}{2a} \right) "i"$$

* $\left(\frac{-b}{2a} \right)$ will be stored at variable y; f, $\left(\frac{\sqrt{\text{abs}(\text{disc})}}{2a} \right)$ will be stored at f; g

if $\text{disc} \geq 0$

$$x_1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$$

$$x_2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

Output:

$$x_1 = y + z$$

$$x_2 = f + g$$

or

$$x_1 = y + z \text{ "i"}$$

$$x_2 = f + g \text{ "i"}$$

or

$$x_1 = y + z$$

$$x_2 = \text{NaN}$$