

C11 - 4.5 - Discriminant Notes

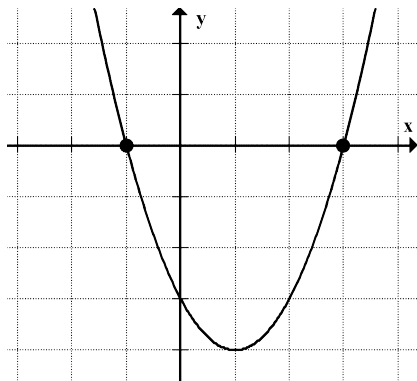
Discriminant: $b^2 - 4ac$

Quadratic Formula:

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

$$x = \frac{-b \pm \sqrt{\text{DISCRIMINANT}}}{2a}$$

Case 1: $b^2 - 4ac > 0$ *Inside the root is positive*



$$x^2 - 2x - 3$$

$$b^2 - 4ac$$

$$(-2)^2 - 4(1)(-3)$$

$$4 + 12$$

$$+16$$

+

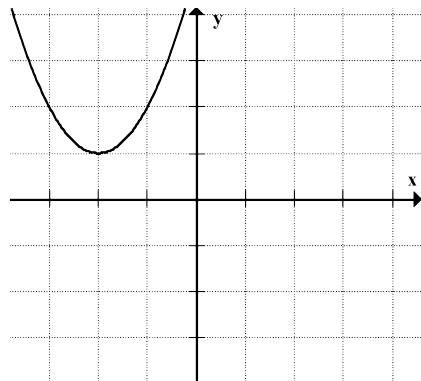
$$x = \frac{2 \pm \sqrt{16}}{2}$$

$$x = 3 \quad x = -1$$

Two x-intercepts
Two Real Roots
Two Solutions

If we add and subtract a positive number we get two answers

Case 2: $b^2 - 4ac < 0$ *Inside the root is negative*



$$x^2 + 4x + 5$$

$$b^2 - 4ac$$

$$(4)^2 - 4(1)(5)$$

$$16 - 20$$

$$-4$$

-

$$x = \frac{-4 \pm \sqrt{-4}}{2}$$

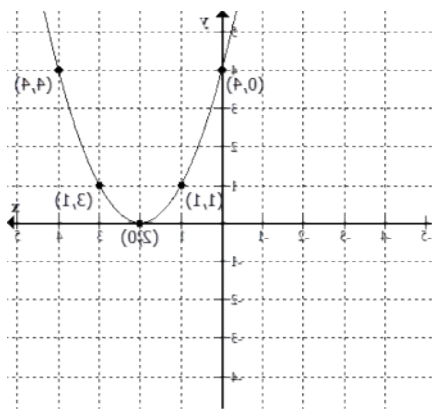
No Solution

Zero x-intercepts
No Real Roots
No Solutions
Imaginary Roots

Cant Square Root Negatives

Case 3: $b^2 - 4ac = 0$ *Inside the root is zero*

$b^2 - 4ac = 0$, *Perfect Square*



$$x^2 + 4x + 4$$

$$b^2 - 4ac$$

$$(4)^2 - 4(1)(4)$$

$$16 - 16$$

$$0$$

0

$$x = \frac{-4 \pm \sqrt{0}}{2}$$

x = -2

One x-intercepts
Two equal/real roots
One Solution

If we add and subtract zero we get one answer