# The Discriminant

**April 22, 2019**

Factor:

$x^2+6x-27$

$(x+9)(x-3)$

$+9$ $+6$ $-27$ $-3$

$5t^2+14t+8$

a·c
5·8
=40
8·5
20·2
10·4

$5t^2+10t+4t+8$

$5t(t+2)+4(t+2)$

$(5t+4)(t+2)$

Solve:

$$x^2+14x-7=33$$
$$-33 \quad -33$$
$$x^2+14x-40=0$$

a = 1
b = 14
c = −40

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

$$\frac{-14\pm\sqrt{(14)^2-4(1)(-40)}}{2(1)}$$

$$\frac{-14\pm\sqrt{196+160}}{2}$$

$$\frac{-14\pm\sqrt{356}}{2}$$

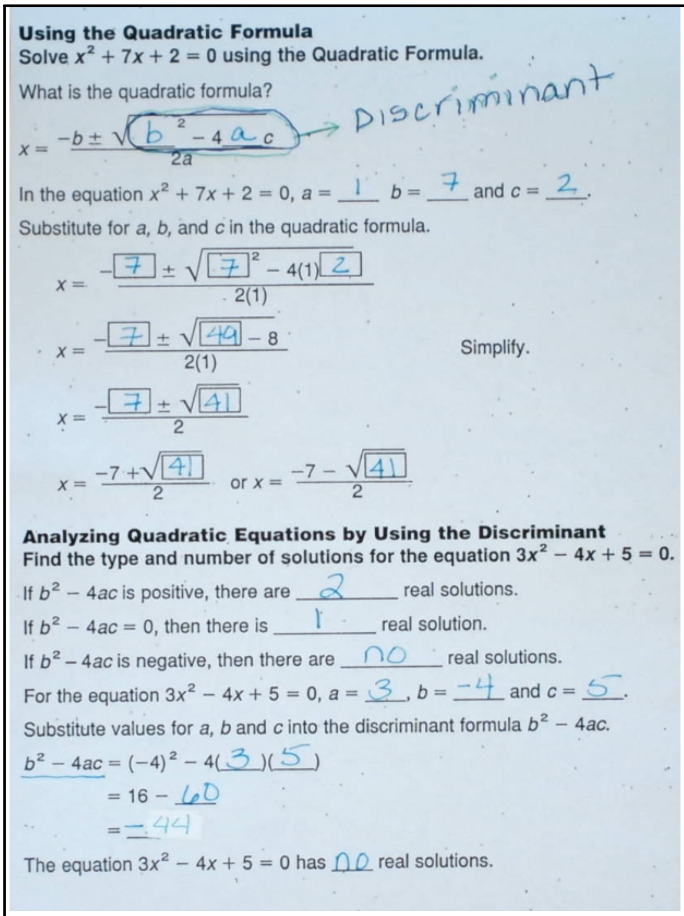
$$\frac{-14\pm2\sqrt{89}}{2}$$

$$\frac{\cancel{2}(-7\pm\sqrt{89})}{\cancel{2}}$$

$$\boxed{-7\pm\sqrt{89}}$$

356
2 178
2 89

$2\sqrt{89}$



**Using the Quadratic Formula**

Solve $x^2 + 7x + 2 = 0$ using the Quadratic Formula.

What is the quadratic formula?

$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ → Discriminant

In the equation $x^2 + 7x + 2 = 0$, a = 1 b = 7 and c = 2.

Substitute for a, b, and c in the quadratic formula.

$$x = \frac{-\boxed{7} \pm \sqrt{\boxed{7}^2 - 4(1)\boxed{2}}}{2(1)}$$

$$x = \frac{-\boxed{7} \pm \sqrt{\boxed{49} - 8}}{2(1)}$$ Simplify.

$$x = \frac{-\boxed{7} \pm \sqrt{\boxed{41}}}{2}$$

$$x = \frac{-7 + \sqrt{\boxed{41}}}{2} \text{ or } x = \frac{-7 - \sqrt{\boxed{41}}}{2}$$

**Analyzing Quadratic Equations by Using the Discriminant**

**Find the type and number of solutions for the equation $3x^2 - 4x + 5 = 0$.**

If $b^2 - 4ac$ is positive, there are 2 real solutions.

If $b^2 - 4ac = 0$, then there is 1 real solution.

If $b^2 - 4ac$ is negative, then there are no real solutions.

For the equation $3x^2 - 4x + 5 = 0$, a = 3, b = −4 and c = 5.

Substitute values for a, b and c into the discriminant formula $b^2 - 4ac$.

$b^2 - 4ac = (-4)^2 - 4(3)(5)$

$= 16 - 60$

$= -44$

The equation $3x^2 - 4x + 5 = 0$ has no real solutions.