4/26

Method 3: The Quadratic Formula

General Form of a quadratic equation: $ax^2 + bx + c = 0$

Quadratic Formula

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

Ex: $x^2 + 4x + 2 = 0$ so $a = 1$, $b = 4$, $c = 2$

So since this does not factor we can plug in a, b, and c into the quadratic formula to solve for x.

$$x = \frac{-4 \pm \sqrt{(4)^2 - 4(1)(2)}}{2(1)} = \frac{-4 \pm \sqrt{16 - 8}}{2}$$

$$= \boxed{\frac{-4 \pm \sqrt{8}}{2}}$$

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

$$= \frac{2(-2 \pm \sqrt{2})}{2}$$

$$= \boxed{-2 \pm \sqrt{2}}$$

Both of these are correct. Only difference is in the bottom we simplified the square root.

Ex: $\frac{36x^2 + 24x - 14}{2} = \frac{0}{2}$

$18x^2 + 12x - 7 = 0$
$a \quad b \quad c$

$$x = \frac{-12 \pm \sqrt{(12)^2 - 4(18)(-7)}}{2(18)}$$

$$= \frac{-12 \pm \sqrt{144 + 504}}{36}$$

$$= \frac{-12 \pm \sqrt{648}}{36}$$

Ex: $3x + 4x^2 - 4 = 0$ ↓ put in standard form

$4x^2 + 3x - 4 = 0$
$a \quad b \quad c$

$$x = \frac{-3 \pm \sqrt{3^2 - 4(4)(-4)}}{2(4)} = \frac{-3 \pm \sqrt{9 + 64}}{8} = \frac{-3 \pm \sqrt{73}}{8}$$

The Discriminant and its implications

→ $b^2 - 4ac$ "a number"

1) Positive → 2 real number solutions

2) Zero → 1 real number solution, repeated

3) Negative → 0 real number solutions

Ex: $8 + 2.7x - 8.3x^2 = 0$

$-8.3x^2 + 2.7x + 8 = 0$

$a \quad b \quad c$

Discriminant: $(2.7)^2 - 4(-8.3)(8) =$

$7.29 + 265.6 = 272.89$

Since the discriminant is positive then this equation has 2 real number solutions.