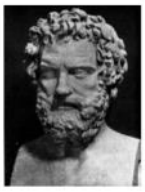
Week 1 Tuesday

January 8, 2019 7:39 AM



"One learns by doing a thing; for though you think you know it, you have no certainty until you try."

– Sophocles

Coursepack on D2L

Office Hours MWF 11:30-1:30 CBA151

Math Lab TEC 142

1.2 Quadratic Equations

4 methods

I. Factoring

II. Square Root Method

Let $p > 0$

$x^2 = p$ has 2 solutions: $x = \pm\sqrt{p}$

Ex: Solve

a) $x^2 = 17$

$x = \pm\sqrt{17}$

b) $(x+7)^2 = 9$

$x+7 = \pm\sqrt{9}$

$x+7 = \pm 3$

$x = -7 \pm 3$

$x = -10, -4$

c) $x^2 = -16$

no solution (disregard complex solutions)

no real solution

III. Completing the Square
IV. Quadratic Formula
} always work

III. Completing the Square

Ex: a) $x^2 + 8x + 6 = 0$

$x^2 + 8x = -6$

$\left(\frac{8}{2}\right)^2 = 16$

Add 16

$x^2 + 8x + 16 = 10$

$(x+4)^2 = 10$

$x + 4 = \pm\sqrt{10}$

$x = -4 \pm \sqrt{10}$

b) $3x^2 + 36x + 20 = 0$

Make leading coefficient = 1

$x^2 + 12x + \frac{20}{3} = 0$

$$x^2 + 12x = -\frac{20}{3}$$

$\left(\frac{12}{2}\right)^2 = 36$

Add 36

$$x^2 + 12x + 36 = 36 - \frac{20}{3}$$ ← $\frac{108}{3} - \frac{20}{3} = \frac{88}{3}$

$$(x+6)^2 = \frac{88}{3}$$

$$x+6 = \pm\sqrt{\frac{88}{3}}$$ ← $\frac{\sqrt{88}}{\sqrt{3}} = \frac{2\sqrt{4}\sqrt{22}}{1}\cdot\frac{\sqrt{3}}{3} = \frac{2\sqrt{66}}{3}$

$$x = -6 \pm \frac{2\sqrt{66}}{3}$$

IV. Quadratic Formula

$ax^2+bx+c=0$ has solutions $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

Know this

Ex: Solve

a) $3x^2 + 7x + 2 = 0$

$$x = \frac{-7 \pm \sqrt{25}}{6}$$ ← $7^2 - 4(3)(2) = 25$

$$x = \frac{-7 \pm 5}{6}$$

$$x = -2, \frac{-2}{6} \quad \text{or} \quad -2, \frac{-1}{3}$$

b) $6x^2 + 3x + 8 = 0$

$$x = \frac{-3 \pm \sqrt{-183}}{12}$$

no real solution

c) $x^2 + 7x + \frac{49}{4} = 0$

$\times 4$: $4x^2 + 28x + 49 = 0$

$$x = \frac{-28 \pm \sqrt{0}}{8}$$

$$x = \frac{-28}{8} \text{ or } -\frac{7}{2}$$

$b^2 - 4ac$ is called the discriminant

- If $b^2 - 4ac > 0$, then the quadratic equation has 2 real solutions
- $b^2 - 4ac = 0$ " 1 real solution
- $b^2 - 4ac < 0$ " no real solution

Ex: How many real solutions?

a) $x^2 + 18x + 12 = 0$

$b^2 - 4ac = 276 > 0$ two

b) $x^2 + 18x + 81 = 0$

b) $x^2 + 18x + 81 = 0$

$b^2 - 4ac = 0$

one