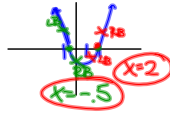


P5 Solving Equations

Obj: 1. Solve quadratic equations graphically, numerically and algebraically.

Graphically:  $2x^2 - 3x - 2 = 0$   
 $y = 2x^2 - 3x - 2$  x-intercepts



Algebraically:  $2x^2 - 3x - 2 = 0$  -4

$(2x^2 - 4x) + (x - 2) = 0$

$2x(x - 2) + 1(x - 2) = 0$

$(x - 2)(2x + 1) = 0$

$x - 2 = 0$     $2x + 1 = 0$   
 $x = 2$     $x = -\frac{1}{2}$

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Algebraically

1. Factoring (zero product prop.)
2. Complete the Square  
\* Extracting Square Roots
3. Quadratic Formula

Quad. Form:

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

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Solve  $\sqrt{(2x-1)^2} = \sqrt{9}$

extracting Square Roots:

$$2x-1 = \pm 3$$

$$\frac{2x}{2} = \frac{1 \pm 3}{2}$$

$$x = \frac{1 \pm 3}{2} = 2, -1$$

~~$2(x-5)^2 = \frac{17}{2}$~~

$\sqrt{(x-5)^2} = \sqrt{8.5}$

$$x-5 = \pm \sqrt{8.5}$$

$$x = 5 \pm \sqrt{8.5} \text{ exact}$$

$$5 + \sqrt{8.5} \quad 5 - \sqrt{8.5}$$

$$\approx 7.9 \text{ approx} \quad \approx 2.1 \text{ approx.}$$

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Completing the Square

Solve:  $\frac{4x^2}{4} - \frac{20x}{4} + \frac{16}{4} = \frac{0}{4}$  1. (coef. of  $x^2$  is a 1

$$\frac{x^2}{1} - \frac{5x}{1} + 4 = 0$$
 2. Everything w/ an x on one side.

$$x^2 - 5x = -4$$
 3. Add  $(\frac{1}{2}b)^2$  to both sides  $ax^2 + bx + c$

$$x^2 - 5x + (\frac{-5}{2})^2 = -4 + (\frac{-5}{2})^2$$

$$\sqrt{(x - \frac{5}{2})^2} = \sqrt{\frac{9}{4}}$$
 4. Write the left side as a perfect square.

$$x - \frac{5}{2} = \pm \frac{3}{2}$$

$$x = \frac{5}{2} \pm \frac{3}{2} = 4, 1$$
 5. Solve

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Solve by completing the square:

$$x^2 + 5x - 9 = 0$$

$$x^2 + 5x = 9$$

$$x^2 + 5x + \left(\frac{5}{2}\right)^2 = 9 + \left(\frac{5}{2}\right)^2$$

$$\sqrt{\left(x + \frac{5}{2}\right)^2} = \sqrt{\frac{61}{4}}$$

$$x + \frac{5}{2} = \pm \frac{\sqrt{61}}{2}$$

$$-\frac{5}{2} - \frac{5}{2}$$

$$x = -\frac{5}{2} \pm \frac{\sqrt{61}}{2}$$

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### Quadratic Formula

$$ax^2 + bx + c = 0$$

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

Solve:  $3x^2 - 6x = 5$

$$3x^2 - 6x - 5 = 0$$

$$a=3 \quad b=-6 \quad c=-5$$

$$x = \frac{6 \pm \sqrt{36 - 4(3)(-5)}}{6}$$

$$x = \frac{6 \pm \sqrt{96}}{6}$$

$$\frac{6 + \sqrt{96}}{6}, \quad \frac{6 - \sqrt{96}}{6}$$

$$\approx 2.63, \quad -.63$$

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Solve using the quad. form. :

$$2x^2 - 3x + 1 = 0$$

$$a=2 \quad b=-3 \quad c=1$$

$$x = \frac{3 \pm \sqrt{9 - 4(2)(1)}}{4}$$

$$x = \frac{3 \pm \sqrt{1}}{4} = \frac{3 \pm 1}{4} = 1, \frac{1}{2}$$

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