

Quad and Radical Equations

Solve quadratic equations:

- Factoring: quadratic equal zero, then factor and solve.
- Quadratic Formula: quadratic equal zero, then use the formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
- Graphing:
 - Equation equals zero, graph and find x-intercepts.
 - Graph Left Side of the equation; Graph Right Side of the equation - find x coordinate of the intersection point.

$$\begin{array}{r} 36 \\ \times 9 \\ \hline 13 \end{array}$$

1. Solve by factoring.

- a) $3x^2 + 13x + 12 = 0$
 b) $3x^2 = 2x + 8$

$$3x^2 + 9x + 4x + 12 = 0$$

$$3x(x+3) + 4(x+3) = 0$$

$$(3x+4)(x+3) = 0$$

$$3x+4=0 \quad x+3=0$$

$$3x=-4 \quad x=-3$$

$$x=-\frac{4}{3} \quad x=-3$$

$$3x^2 - 2x - 8 = 0$$

$$3x^2 + 4x - 6x - 8 = 0$$

$$x(3x+4) - 2(3x+4) = 0$$

$$(3x+4)(x-2) = 0$$

$$x = -\frac{4}{3} \quad x = 2$$

2. Solve with the quadratic formula (exact answers).

- a) $2x^2 + 11x + 12 = 0$
 b) $5x = x^2 - 2$
 c) $4x^2 - 6x + 1 = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad a=2 \quad b=11 \quad c=12$$

$$x = \frac{-11 \pm \sqrt{121 - 4(2)(12)}}{2(2)} = \frac{-11 \pm \sqrt{121 - 96}}{4}$$

$$x = \frac{-11 \pm \sqrt{25}}{4} \quad \sqrt{25} = 5$$

$$x = \frac{-11+5}{4} = -\frac{6}{4} = -\frac{3}{2} \quad x = \frac{-11-5}{4} = -\frac{16}{4} = -4$$

b) $5x = x^2 - 2$
 $0 = x^2 - 5x - 2$
 $a=1 \quad b=-5 \quad c=-2$
 $b^2 = 25$

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

$$x = \frac{5 \pm \sqrt{25 - 4(1)(-2)}}{2(1)} = \frac{5 \pm \sqrt{33}}{2}$$

$$x = \frac{5 \pm \sqrt{33}}{2}$$

c) $4x^2 - 6x + 1 = 0$
 $a=4 \quad b=-6 \quad c=1$
 $b^2 = 36$

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

$$x = \frac{6 \pm \sqrt{36 - 4(4)(1)}}{2(4)} = \frac{6 \pm \sqrt{36 - 16}}{8}$$

$$x = \frac{6 \pm \sqrt{20}}{8}$$

$$\sqrt{20} = \sqrt{4 \cdot 5} = 2\sqrt{5}$$

$$x = \frac{6 \pm 2\sqrt{5}}{8}$$

... number : number
 radical : radical

$$x = \frac{3 \pm \sqrt{5}}{4}$$

Quad and Radical Equations

3. Solve with the quadratic formula (rounded answers to hundredths).

a) $2x^2 + 3x + 1 = 0$

b) $5x^2 = 3x + 10$

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

a) $2x^2 + 3x + 1 = 0$
 $a=2$ $b=3$ $c=1$
 $b^2=9$

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

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

$$x = \frac{-3+1}{4}$$

$$x = \frac{-3-1}{4}$$

$$= \frac{-2}{4} = -0.5 \quad = \frac{-4}{4} = -1$$

b) quad = zero

$$5x^2 - 3x - 10 = 0$$

$$a=5 \quad b=-3 \quad c=-10$$

$$b^2=9$$

$$x = \frac{3 \pm \sqrt{9 - 4(5)(-10)}}{2(5)}$$

$$x = \frac{3 \pm \sqrt{209}}{10}$$

$$x = \frac{3 + 14.46}{10}$$

$$x = \frac{3 - 14.46}{10}$$

$$x = 1.7$$

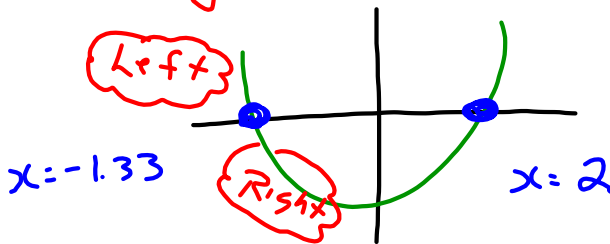
$$x = -1.1$$

4. Solve by graphing, rounded answers to hundredths as necessary.

a) $3x^2 - 2x - 8 = 0$

b) $5x = x^2 - 8$

4a) $y = 3x^2 - 2x - 8$... "zero"



4b) $5x = x^2 - 8$

$$y_1 = 5x$$

$$y_2 = x^2 - 8$$

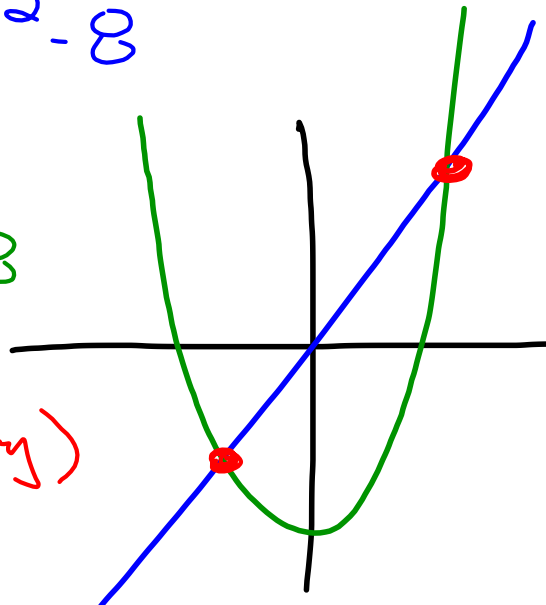
intersect

(x, y) and (x, y)



$$x = -1.2749 \quad x = 6.2749$$

$$x = -1.27 \quad x = 6.27$$



Quad and Radical Equations

Solve Radical Equations.

1. Solve. State the restrictions on x . (6 marks)

a) $2\sqrt{x} = 6$

$\sqrt{x} = 3 \div 2$
 $x = 9$
 square "3x3"

b) $\sqrt{x-4} = 5$

$x-4 = 25$
 $x = 29$
 already isolated...
 "square" 5x5
 add 4

c) $2\sqrt{x+3} - 5 = 7$

isolate $\sqrt{x+3}$

2 $\sqrt{x+3} = 12$

opposite... add 5

$\sqrt{x+3} = 6$

... square

... $\div 2$

$x+3 = 36$

$x = 33$

d) $7 + \sqrt{3x} = \sqrt{5x+4} + 5$

$2 + \sqrt{3x} = \sqrt{5x+4}$

$(2 + \sqrt{3x})(2 + \sqrt{3x}) = 5x + 4$

$4 + 4\sqrt{3x} + 3x = 5x + 4$

$4\sqrt{3x} = 2x$

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

$3x = \frac{1}{4}x^2$

$12x = x^2$

$0 = x^2 - 12x$

$0 = x(x-12)$

$x = 0 \quad x = 12$