

HW: 9.5/16-27 (don't round, use radicals)

Warm up:

Solve by completing the square.

$$1) x^2 + 4x - 5 = 0$$

$$\begin{array}{r} x^2 + 4x = 5 \\ \quad \downarrow 4 \quad \downarrow 4 \\ \hline x^2 + 4x + 4 = 9 \\ \sqrt{(x+2)^2} = \sqrt{9} \\ x+2 = \pm 3 \\ \quad \downarrow -2 \quad \downarrow -2 \\ \hline x = -2 \pm 3 = \boxed{1, -5} \end{array}$$

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

$$\begin{array}{r} \frac{3x^2 - 2x + 1 = 0}{3} \\ \hline x^2 - \frac{2}{3}x + \frac{1}{3} = 0 \\ \quad \quad \quad \downarrow \frac{1}{3} \\ \hline x^2 - \frac{2}{3}x = -\frac{1}{3} \\ \quad \quad \quad \downarrow \frac{1}{9} \quad \downarrow \frac{1}{9} \\ \hline x^2 - \frac{2}{3}x + \frac{1}{9} = -\frac{1}{3} + \frac{1}{9} \\ \sqrt{\left(x - \frac{1}{3}\right)^2} = \sqrt{-\frac{2}{9}} \\ x - \frac{1}{3} = \sqrt{-\frac{2}{9}} \\ \boxed{\text{no solution}} \end{array}$$

$\left(\frac{2}{3}\right)^2 = \frac{4}{9}$
 $\left(-\frac{1}{3}\right)^2 = \frac{1}{9}$
 $\frac{4}{9} - \frac{1}{9} = \frac{3}{9} = \frac{1}{3}$

$$\frac{ax^2 + bx + c}{a} = \frac{0}{a}$$

$$x^2 + \frac{b}{a}x + \frac{c}{a} = 0$$

$$\frac{a}{a} \cdot \frac{b}{2a} = 2$$

$$\left(\frac{b}{2a}\right)^2$$

$$\frac{b^2}{4a^2}$$

$$x^2 + \frac{b}{a}x = -\frac{c}{a}$$

$$+\frac{b^2}{4a^2} \quad +\frac{b^2}{4a^2}$$

$$x^2 + \frac{b}{a}x + \frac{b^2}{4a^2} = \frac{b^2}{4a^2} - \frac{c}{a}$$

$$\sqrt{\left(x + \frac{b}{2a}\right)^2} = \sqrt{\frac{b^2}{4a^2} - \frac{c}{a}}$$

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

$$-\frac{b}{2a} \quad -\frac{b}{2a}$$

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

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

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

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

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

Quadratic Formula

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

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

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

$$\frac{3 \pm \sqrt{9 - 4(1)(-10)}}{2}$$

$$\frac{3 \pm \sqrt{9 + 40}}{2}$$

$$\frac{3 \pm \sqrt{49}}{2} = \frac{3 \pm 7}{2} = \boxed{5, -2}$$

$$a=1$$
$$b=-3$$
$$c=-10$$

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

$$9x^2 + 12x - 1 = 0$$

$$\frac{-12 \pm \sqrt{144 - 4(9)(-1)}}{18}$$

$$\frac{-12 \pm \sqrt{144 + 36}}{18}$$

$$144 - (-36)$$

$$\frac{-12 \pm \sqrt{180}}{18}$$

$$\frac{-12 \pm 3\sqrt{20}}{18}$$

$$\frac{-12 \pm 6\sqrt{5}}{18}$$

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

$$4r^2 = 0.6r + 0.5$$

$$\begin{array}{ccc} -0.6r & -0.5 & -0.6r & -0.5 \\ \hline \end{array}$$

$$10(4r^2 - 0.6r - 0.5) = (0)10$$

$$40r^2 - 6r - 5 = 0$$

$$\frac{6 \pm \sqrt{36 - 4(40)(-5)}}{80}$$

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

$$\frac{6 \pm \sqrt{36 + 800}}{80}$$

$$\frac{6 \pm \sqrt{836}}{80}$$

$$\frac{6 \pm 2\sqrt{209}}{80} = \frac{3 \pm \sqrt{209}}{40}$$

HW Solutions

$$\Leftrightarrow \frac{4x^2 + 6x = 12}{4}$$

$$\frac{x^2 + \frac{3}{2}x = 3 = \frac{48}{16}}{\quad \quad \quad + \frac{9}{16} \quad + \frac{9}{16} \quad + \frac{9}{16}}$$

$$\frac{x^2 + \frac{3}{2}x + \frac{9}{16} = \frac{57}{16}}$$

$$\sqrt{\left(x + \frac{3}{4}\right)^2} = \sqrt{\frac{57}{16}}$$

$$x + \frac{3}{4} = \pm \frac{\sqrt{57}}{4}$$

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

$$x = -\frac{3}{4} \pm \frac{\sqrt{57}}{4}$$

$$x = \frac{-3 \pm \sqrt{57}}{4}$$

$$\textcircled{2} \frac{-2x^2 + 10x}{-2} = \frac{-14}{-2}$$

$$x^2 - 5x = 7 = \frac{28}{4}$$

$$x^2 - 5x + \frac{25}{4} = \frac{53}{4}$$

$$\sqrt{\left(x - \frac{5}{2}\right)^2} = \sqrt{\frac{53}{4}}$$

$$x - \frac{5}{2} = \pm \frac{\sqrt{53}}{2}$$

$$x = \frac{5 \pm \sqrt{53}}{2}$$

$$\textcircled{5} \quad x^2 - 13x + c$$

$$\left(\frac{13}{2}\right)^2 = \frac{169}{4}$$

1) $5z^2 - 11z + 2 = 0$

2) $x^2 - 6x - 11 = 0$

3) $r^2 + 8r + 5 = 0$

4) $7x^2 + 2x - 2 = 0$

5) $3x^2 + 8x = 2$

6) $x^2 = x - 8$

7) $2c^2 + \frac{1}{2}c + \frac{2}{3} = 0$

8) $5x^2 - 4x + 1 = 0$

$$1) 5z^2 - 11z + 2 = 0$$

$$\frac{11 \pm \sqrt{121 - 4(5)(2)}}{10}$$

$$11 \pm \sqrt{121 - 40}$$

$$\frac{11 \pm \sqrt{81}}{10}$$

$$\frac{11 \pm 9}{10} = \left(2, \frac{1}{5} \right)$$

$$2) x^2 - 6x - 11 = 0$$

$$\frac{6 \pm \sqrt{36 - 4(1)(-11)}}{2}$$

$$\frac{6 \pm \sqrt{36 + 44}}{2}$$

$$\frac{6 \pm \sqrt{80}}{2} = \frac{6 \pm 4\sqrt{5}}{2} = 3 \pm 2\sqrt{5}$$

$$3) r^2 + 8r + 5 = 0$$

$$\frac{-8 \pm \sqrt{64 - 4(1)(5)}}{2}$$

$$\frac{-8 \pm \sqrt{64 - 20}}{2}$$

$$\frac{-8 \pm \sqrt{44}}{2}$$

$$\frac{-8 \pm 2\sqrt{11}}{2} = -4 \pm \sqrt{11}$$

$$4) 7x^2 + 2x - 2 = 0$$

$$\frac{-2 \pm \sqrt{4 - 4(7)(-2)}}{14}$$

$$\frac{-2 \pm \sqrt{4 + 56}}{14}$$

$$\frac{-2 \pm \sqrt{60}}{14} = \frac{-2 \pm 2\sqrt{15}}{14} = \frac{-1 \pm \sqrt{15}}{7}$$

$$5) 3x^2 + 8x = 2$$

$$\begin{array}{r} -2-2 \\ \hline 3x^2 + 8x - 2 = 0 \end{array}$$

$$\frac{-8 \pm \sqrt{64 - 4(3)(-2)}}{6}$$

$$\frac{-8 \pm \sqrt{64 + 24}}{6}$$

$$\frac{-8 \pm \sqrt{88}}{6} = \frac{-8 \pm 2\sqrt{22}}{6} = \frac{-4 \pm \sqrt{22}}{3}$$

$$6) x^2 = x - 8$$

$$\begin{array}{r} -x+8 \\ -x+8 \end{array}$$

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

$$\frac{1 \pm \sqrt{1 - 4(1)(8)}}{2}$$

$$\frac{1 \pm \sqrt{1 - 32}}{2}$$

$$\frac{1 \pm \sqrt{-31}}{2}$$

no solution

$$6) \left(2c^2 + \frac{1}{2}c + \frac{2}{3} \right) = (0) 6$$

$$12c^2 + 3c + 4 = 0$$

$$8) 5x^2 - 4x + 1 = 0$$

