In general, to complete the square:

$$x^2 + 16x = (x \quad)^2$$

2nd

$$x^2 + bx + \left(\frac{b}{2}\right)^2 = \left(x + \frac{b}{2}\right)^2$$

1st

Solve by Completing the Square:

1. Get the equation into the following form: $x^2 + bx = c$

2. Complete the square so the equation becomes: $(x - h)^2 = k$

3. Solve for x using Square Roots.

Solving by completing the square works best if:

1. $a = 1$

2. b is even

Solve by Completing the Square.

$x^2 - 8x - 11 = 0$
$+11 \qquad +11$

$$x^2 - 8x + 16 = 11 + 16$$
$$\frac{b}{2} \qquad \left(\frac{b}{2}\right)^2$$

$$\sqrt{(x-4)^2} = \sqrt{27}$$

$$x - 4 = \pm 3\sqrt{3} \longrightarrow \boxed{4 \quad \pm 3\sqrt{3}}$$
$$+4 \qquad\qquad +4$$

Solve by Completing the Square.

$x^2 - 4x - 1 = 13$
$ +1 \quad +1$

$x^2 - 4x + 4 = 14 + 4$

$\sqrt{(x-2)^2} = \sqrt{18}$

$x - 2 = \pm 3\sqrt{2} =$
$ +2 \quad\quad +2$

$$\boxed{2 \pm 3\sqrt{2}}$$

Solve by Completing the Square.

$x^2 + 10x = -21$

$x^2 + 10x + 25 = -21 + 25$

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

$x + 5 = \pm 2$
$ -5 \quad\quad -5$

$+2 \quad -5$
$-2 \quad -5$

$$\boxed{x = -3, -7}$$

Solve by Completing the Square.

$x^2 - 6x + 23 = 0$

$x^2 - 6x + 9 = -23 + 9$

$\sqrt{(x-3)^2} = \sqrt{-14}$

No Real Solution

Solve by Completing the Square.

$$\frac{2x^2 - 36x + 10}{2} = \frac{0}{2}$$

$x^2 - 18x + 5 = 0$

$x^2 - 18x + 81 = -5 + 81$

$\sqrt{(x-9)^2} = \sqrt{76}$

$x - 9 = \pm 2\sqrt{19}$

$$\boxed{x = 9 \pm 2\sqrt{19}}$$

Solve by Completing the Square.

$$2x^2 + 7x - 5 = 0$$

$$\frac{2x^2 + 7x}{2} = \frac{5}{2}$$

$$x^2 + \frac{7}{2}x + \frac{49}{16} = \frac{5}{2} + \frac{49}{16}$$

$$\frac{40}{16} + \frac{49}{16} = \frac{89}{16}$$

$$\sqrt{\left(x + \frac{7}{4}\right)^2} = \sqrt{\frac{89}{16}}$$

$$x + \frac{7}{4} = \pm\frac{\sqrt{89}}{4}$$

$$x = -\frac{7}{4} \pm \frac{\sqrt{89}}{4} = \frac{-7 + \sqrt{89}}{4}$$

Solve by completing the square.

$$5x^2 - 8x + 3 = 0$$

$$\frac{5x^2}{5} - \frac{8x}{5} = \frac{-3}{5}$$

$$x^2 - \frac{8}{5}x + \frac{16}{25} = \frac{-3}{5} + \frac{16}{25}$$

$$\frac{-15}{25} + \frac{16}{25} = \frac{1}{25}$$

$$\sqrt{\left(x - \frac{4}{5}\right)^2} = \sqrt{\frac{1}{25}}$$

$$x - \frac{4}{5} = \pm\frac{1}{5}$$

$$\begin{array}{l} +\frac{1}{5} + \frac{4}{5} \\ -\frac{1}{5} + \frac{4}{5} \end{array} \Big\} \quad x = 1, \frac{3}{5}$$

Rewrite this equation into Vertex Form: $y = a(x-h)^2 + k$

Method 1: Find the LOS and the y-coord of the vertex then write in Vertex Form:

$$y = x^2 + 10x - 7$$

LOS: $\frac{-b}{2a} = -5$

Vertex $(-5, -32)$

$$(-5)^2 + 10(-5) - 7$$

$$y = (x+5)^2 - 32$$

Method 2: Complete the Square:

$$y = x^2 + 10x - 7$$

$$y + 7 + 25 = x^2 + 10x + 25$$

$$\frac{b}{2} = 5 \qquad 5^2$$

$$y + 32 = (x+5)^2$$

$$y = (x+5)^2 - 32$$

Rewrite this equation into Vertex Form:

$$y = -x^2 - 8x + 11$$

$$\frac{y - 11}{-1} = \frac{-x^2 - 8x}{-1}$$

$$\frac{y-11}{-1} + 16 = x^2 + 8x + 16$$

$$\frac{y-11}{-1} + 16 = (x+4)^2$$

$$y = -1\left[(x+4)^2 - 16\right] + 11$$

$$y = -(x+4)^2 + 16 + 11$$

$$y = -(x+4)^2 + 27$$

You can now finish Hwk #21

Sec 5-7   Due Tomorrow

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Problems 7, 8, 14, 17, 21, 28, 33, 42, 43