Complete the square to find the vertex form.

$$y = 2x^2 + 6x - 16$$

$2x^2 + 6x \cancel{-16} = y \; {+16}$ $\quad +16$

① Move c

$2x^2 + 6x = y + 16$

② factor out "a"

$2(x^2 + 3x + \frac{9}{4}) = y + 16 + \frac{18}{4}$

③ find new "c"

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

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

add new c inside the ( )

* Multiply the # outside of the ( ) by the new c & add to the other side

$2(x^2 + 3x + \frac{9}{4}) = y + \frac{41}{2}$

$2(x + \frac{3}{2})^2 = y + \frac{41}{2}$

④ Factor the Trinomial

Solve

plug zero in for y & solve

$2(x + \frac{3}{2})^2 = 0 + \frac{41}{2}$

$\frac{\cancel{2}(x + \frac{3}{2})^2}{\cancel{2}} = \frac{\frac{41}{2}}{2}$

$\sqrt{(x + \frac{3}{2})^2} = \sqrt{\frac{41}{4}} = \frac{\sqrt{41}}{\sqrt{4}}$

$x + \cancel{\frac{3}{2}} = \pm \frac{\sqrt{41}}{2}$

$\quad -\cancel{\frac{3}{2}} \qquad -\frac{3}{2}$

$$\boxed{x = \frac{-3}{2} \pm \frac{\sqrt{41}}{2}}$$

Complete the square to find the vertex form.

$$f(x) = -2x^2 + 8x - 7$$

$-2x^2 + 8x \cancel{-7} = y$
$\quad +7 \qquad +7$

$-2x^2 + 8x = y + 7$

$-2(x^2 - 4x \quad) = y + 7$

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

$-2(x^2 - 4x + 4) = y + 7 - 8$

$-2(x - 2)^2 = y - 1$

Solve

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

$\frac{\cancel{-2}(x-2)^2}{-2} = \frac{-1}{-2}$

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

$x - 2 = \pm\sqrt{\frac{1}{2}}$

$\frac{\sqrt{1}}{\sqrt{2}} = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$= \frac{\sqrt{2}}{2}$

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

$\boxed{x = 2 \pm \frac{\sqrt{2}}{2}}$

Complete the square to find the vertex form.

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

$$-3x^2 - 6x - \cancel{5} = y$$
$$\cancel{+5} \qquad +5$$

$$-3x^2 - 6x = y + 5$$

$$-3(x^2 + 2x \quad) = y + 5$$

$$\left(\frac{2}{2}\right)^2 = 1$$

$$-3(x^2 + 2x + 1 \quad) = y + 5 - 3$$

$$-3(x+1)^2 = y + 2$$

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

$$\frac{\cancel{-3}(x+1)^2}{\cancel{-3}} = \frac{2}{-3}$$

$$\sqrt{(x+1)^2} = \sqrt{-\frac{2}{3}}$$

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

$$\frac{i\sqrt{2}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{i\sqrt{6}}{3}$$

$$x \cancel{+1} = \pm \frac{i\sqrt{6}}{3}$$
$$\cancel{-1} \qquad -1$$

$$\boxed{x = -1 \pm \frac{i\sqrt{6}}{3}}$$