Find the equation of the linear function in all three forms that passes through the points (-4, -1) and (-9, 2).

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad \frac{2-(-1)}{-9-(-4)} = \frac{3}{-5}$

$y - y_1 = m(x - x_1)$ pt-slope

$y = mx + b$ slope-Intercept

$Ax + By = C$ Standard Form

$y - 2 = -\frac{3}{5}(x + 9)$ $\qquad y + 1 = -\frac{3}{5}(x + 4)$

$y - 2 = -\frac{3}{5}x - \frac{27}{5}$ $\qquad y + 1 = -\frac{3}{5}x - \frac{12}{5}$

$+2 \qquad +\frac{10}{5}$ $\qquad -1 \qquad -\frac{5}{5}$

$y = -\frac{3}{5}x - \frac{17}{5}$ $\qquad y = -\frac{3}{5}x - \frac{17}{5}$

$5\left(\frac{3}{5}x\right) + (y) = \left(-\frac{17}{5}\right)5$

$3x + 5y = -17$

Find the vertex of the function without completing the square. Write the function in vertex form. Find the x-intercepts without using the quadratic formula.

$f(x) = x^2 + 4x - 6$

$x = \frac{-b}{2a}$

$= \frac{-4}{2(1)} = -2$

$f(-2) = (-2)^2 + 4(-2) - 6$

$4 - 8 - 6$

-10

$V(\overset{h}{-2}, \overset{k}{-10})$ ★

$y = a(x-h)^2 + k$

$y = (x+2)^2 - 10$ ★

$(x+2)^2 - 10 = 0$

$\sqrt{(x+2)^2} = \sqrt{10}$

$x + 2 = \pm\sqrt{10}$

$x = -2 \pm \sqrt{10}$ ★

Write each function in vertex form by completing the square. Give the vertex. Find the x-intercepts by using the quadratic formula.

$f(x) = 2x^2 + 6x + 7$

$\frac{f(x)}{2} = x^2 + 3x + \frac{7}{2}$

$\frac{f(x)}{2} - \frac{7}{2} = x^2 + 3x + \frac{9}{4}$

$+\frac{9}{4}$ $\quad (\frac{3}{2})^2$ $\quad \frac{9}{4}$

$\frac{f(x)}{2} - \frac{5}{4} = \left(x + \frac{3}{2}\right)^2$

$2\left(\frac{f(x)}{2}\right) = 2\left(x + \frac{3}{2}\right)^2 + \left(\frac{5}{4}\right)^2$

$f(x) = 2\left(x + \frac{3}{2}\right)^2 + \frac{5}{2}$

$V\left(-\frac{3}{2}, \frac{5}{2}\right)$

$a=2 \quad b=6 \quad c=7$

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

$-\frac{6}{2(2)} \pm \frac{\sqrt{6^2-4(2)(7)}}{2(2)}$

$-\frac{6}{4} \pm \frac{\sqrt{36-56}}{4}$

$-\frac{3}{2} \pm \frac{\sqrt{-20}}{4}$

No x-intercepts

$g(x) = 5x^2 - 25x + 12$

$\frac{g(x)}{5} = x^2 - 5x + \frac{12}{5}$

$\frac{g(x)}{5} - \frac{12}{5} = x^2 - 5x + \frac{25}{4}$

$+\frac{25}{4}$ $\quad (\frac{5}{2})^2$ $\quad \frac{25}{4}$

$\frac{g(x)}{5} + \frac{77}{20} = \left(x - \frac{5}{2}\right)^2$

$5\left(\frac{g(x)}{5}\right) = 5\left(x - \frac{5}{2}\right)^2 + \left(\frac{77}{20}\right)5$

$g(x) = 5\left(x - \frac{5}{2}\right)^2 - \frac{77}{4}$

$V\left(\frac{5}{2}, -\frac{77}{4}\right)$

$a=5 \quad b=-25 \quad c=12$

$\frac{25}{2(5)} \pm \frac{\sqrt{(-25)^2-4(5)(12)}}{2(5)}$

$\frac{25}{10} \pm \frac{\sqrt{625-240}}{10}$

$\frac{5}{2} \pm \frac{\sqrt{385}}{10}$

Find the equation of the quadratic function that has a vertex of (-2, 5) and passes through the point (1,2).

h k

x y

$y = a(x-h)^2 + k$

$2 = a(1+2)^2 + 5$

$(3)^2$

$2 = 9a + 5$

$-5 \quad -5$

$-3 = 9a$

$a = -\frac{1}{3}$