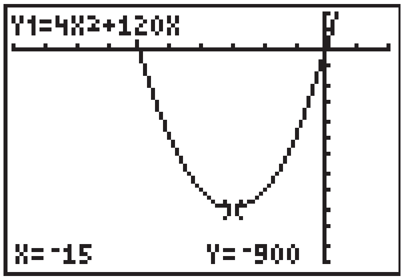
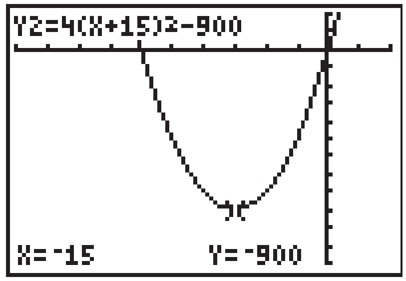


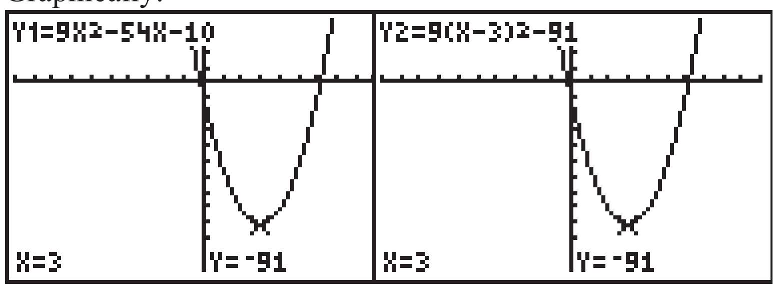


c) Verify that $y = 9x^2 - 54x - 10$ and $y = 9(x - 3)^2 - 91$ represent the same function, algebraically and graphically.

Algebraically:

$y = 9(x - 3)^2 - 91$
$y = 9(x^2 - 6x + 9) - 91$
$y = 9x^2 - 54x + 81 - 91$
$y = 9x^2 - 54x - 10$

Graphically:

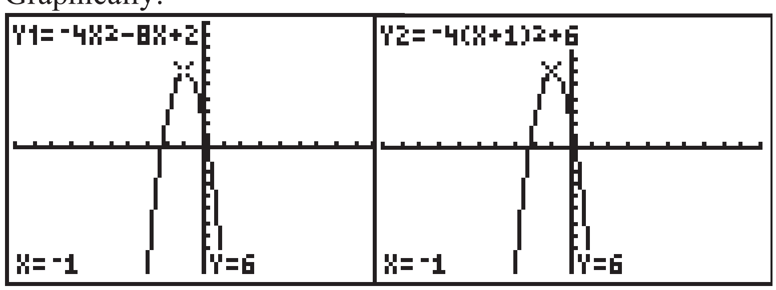


d) Verify that $y = -4x^2 - 8x + 2$ and $y = -4(x + 1)^2 + 6$ represent the same function, algebraically and graphically.

Algebraically:

$y = -4(x + 1)^2 + 6$
$y = -4(x^2 + 2x + 1) + 6$
$y = -4x^2 - 8x - 4 + 6$
$y = -4x^2 - 8x + 2$

Graphically:



Section 3.3 Page 193 Question 6

a) Complete the square to determine the maximum or minimum value of $y = x^2 + 6x - 2$.

$y = x^2 + 6x - 2$
$y = (x^2 + 6x + 9 - 9) - 2$
$y = (x^2 + 6x + 9) - 9 - 2$
$y = (x + 3)^2 - 11$

Since $a > 0$, the graph has a minimum value of -11 when $x = -3$.

b) Complete the square to determine the maximum or minimum value of $y = 3x^2 - 12x + 1$.
$y = 3x^2 - 12x + 1$
$y = 3(x^2 - 4x) + 1$
$y = 3(x^2 - 4x + 4 - 4) + 1$
$y = 3[(x^2 - 4x + 4) - 4] + 1$
$y = 3[(x - 2)^2 - 4] + 1$
$y = 3(x - 2)^2 - 12 + 1$
$y = 3(x - 2)^2 - 11$
Since $a > 0$, the graph has a minimum value of -11 when $x = 2$.

c) Complete the square to determine the maximum or minimum value of $y = x^2 + 6x - 2$.
$y = -x^2 - 10x$
$y = -(x^2 + 10x)$
$y = -(x^2 + 10x + 25 - 25)$
$y = -[(x^2 + 10x + 25) - 25]$
$y = -[(x + 5)^2 - 25]$
$y = -(x + 5)^2 + 25$
Since $a < 0$, the graph has a maximum value of 25 when $x = -5$.

d) Complete the square to determine the maximum or minimum value of $y = -2x^2 + 8x - 3$.
$y = -2(x^2 - 4x) - 3$
$y = -2(x^2 - 4x + 4 - 4) - 3$
$y = -2[(x^2 - 4x + 4) - 4] - 3$
$y = -2[(x - 2)^2 - 4] - 3$
$y = -2(x - 2)^2 + 8 - 3$
$y = -2(x - 2)^2 + 5$
Since $a < 0$, the graph has a maximum value of 5 when $x = 2$.

Section 3.3 Page 193 Question 7

a) Complete the square to determine the maximum or minimum value.
$f(x) = x^2 + 5x + 3$
$f(x) = (x^2 + 5x) + 3$
$f(x) = (x^2 + 5x + 6.25 - 6.25) + 3$
$f(x) = (x^2 + 5x + 6.25) - 6.25 + 3$
$f(x) = (x + 2.5)^2 - 6.25 + 3$
$f(x) = (x + 2.5)^2 - 3.25$
Since $a > 0$, the graph has a minimum value of -3.25.

b) Complete the square to determine the maximum or minimum value.
$f(x) = 2x^2 - 2x + 1$
$f(x) = 2(x^2 - x) + 1$
$f(x) = 2(x^2 - x + 0.25 - 0.25) + 1$
$f(x) = 2[(x^2 - x + 0.25) - 0.25] + 1$
$f(x) = 2[(x - 0.5)^2 - 0.25] + 1$
$f(x) = 2(x - 0.5)^2 - 0.5 + 1$
$f(x) = 2(x - 0.5)^2 + 0.5$
Since $a > 0$, the graph has a minimum value of 0.5.

c) Complete the square to determine the maximum or minimum value.
$f(x) = -0.5x^2 + 10x - 3$
$f(x) = -0.5(x^2 - 20x) - 3$
$f(x) = -0.5(x^2 - 20x + 100 - 100) - 3$
$f(x) = -0.5[(x^2 - 20x + 100) - 100] - 3$
$f(x) = -0.5[(x - 10)^2 - 100] - 3$
$f(x) = -0.5(x - 10)^2 + 50 - 3$
$f(x) = -0.5(x - 10)^2 + 47$
Since $a < 0$, the graph has a maximum value of 47.

d) Complete the square to determine the maximum or minimum value.
$f(x) = 3x^2 - 4.8x$
$f(x) = 3(x^2 - 1.6x)$
$f(x) = 3(x^2 - 1.6x + 0.64 - 0.64)$
$f(x) = 3[(x^2 - 1.6x + 0.64) - 0.64]$
$f(x) = 3[(x - 0.8)^2 - 0.64]$
$f(x) = 3(x - 0.8)^2 - 1.92$
Since $a > 0$, the graph has a minimum value of –1.92.

e) Complete the square to determine the maximum or minimum value.
$f(x) = -0.2x^2 + 3.4x + 4.5$
$f(x) = -0.2(x^2 - 17x) + 4.5$
$f(x) = -0.2(x^2 - 17x + 72.25 - 72.25) + 4.5$
$f(x) = -0.2[(x^2 - 17x + 72.25) - 72.25] + 4.5$
$f(x) = -0.2[(x - 8.5)^2 - 72.25] + 4.5$
$f(x) = -0.2(x - 8.5)^2 + 14.45 + 4.5$
$f(x) = -0.2(x - 8.5)^2 + 18.95$
Since $a < 0$, the graph has a maximum value of 18.95.

f) Complete the square to determine the maximum or minimum value.

$f(x) = -2x^2 + 5.8x - 3$
$f(x) = -2(x^2 - 2.9x) - 3$
$f(x) = -2(x^2 - 2.9x + 2.1025 - 2.1025) - 3$
$f(x) = -2[(x^2 - 2.9x + 2.1025) - 2.1025] - 3$
$f(x) = -2[(x - 1.45)^2 - 2.1025] - 3$
$f(x) = -2(x - 1.45)^2 + 4.205 - 3$
$f(x) = -2(x - 1.45)^2 + 1.205$

Since $a < 0$, the graph has a maximum value of 1.205.

Section 3.3 Page 193 Question 8

a) Convert $y = x^2 + \frac{3}{2}x - 7$ to vertex form.

$$y = x^2 + \frac{3}{2}x - 7$$
$$y = \left(x^2 + \frac{3}{2}x\right) - 7$$
$$y = \left(x^2 + \frac{3}{2}x + \frac{9}{16} - \frac{9}{16}\right) - 7$$
$$y = \left(x^2 + \frac{3}{2}x + \frac{9}{16}\right) - \frac{9}{16} - 7$$
$$y = \left(x + \frac{3}{4}\right)^2 - \frac{121}{16}$$

b) Convert $y = -x^2 - \frac{3}{8}x$ to vertex form.

$$y = -x^2 + \frac{3}{8}x$$
$$y = -\left(x^2 - \frac{3}{8}x\right)$$
$$y = -\left(x^2 - \frac{3}{8}x + \frac{9}{256} - \frac{9}{256}\right)$$
$$y = -\left[\left(x^2 + \frac{3}{8}x + \frac{9}{256}\right) - \frac{9}{256}\right]$$
$$y = -\left[\left(x + \frac{3}{16}\right)^2 - \frac{9}{256}\right]$$
$$y = -\left(x + \frac{3}{16}\right)^2 + \frac{9}{256}$$