Accelerated 65 - 95 HW 25 (R 6.2) Quadratic Functions 2 Name: _____

**Concepts and Vocabulary:**

1. Compared to the graph of $f(x) = x^2$, the graph of $g(x) =$_____ is shifted upward 2 units.

2. Compared to the graph of $f(x) = x^2$, the graph of $g(x) =$_____ is shifted to the right 2 units.

3. The vertex of $f(x) = (x-1)^2 + 2$ is _____.

5. A quadratic function $f$ may be written in 2 different forms. What are they?

6. The vertex form of a parabola is given by _____ and its vertex is _____.

**Tables and Translations:**

In exercises 11 and 13, Complete the table for each translation of $f(x) = x^2$. State what the translation does.

11.

| $x$ | -2 | -1 | 0 | 1 | 2 |
|---|---|---|---|---|---|
| $f(x) = x^2$ | | | | | |
| $g(x) = x^2 - 3$ | | | | | |

What did the translation do to $f(x)$?

13.

| $x$ | | | | | |
|---|---|---|---|---|---|
| $f(x) = x^2$ | 4 | 1 | 0 | 1 | 4 |

| $x$ | | | | | |
|---|---|---|---|---|---|
| $g(x) = (x-3)^2$ | 4 | 1 | 0 | 1 | 4 |

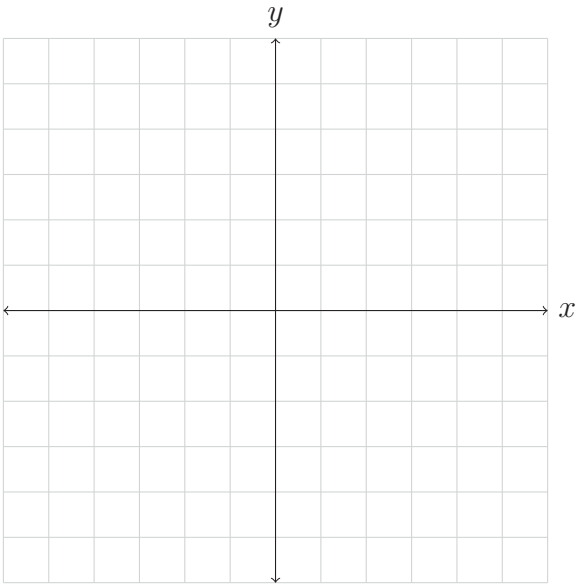
What did the translation do to $f(x)$?

**Graphs of Parabolas:**

In exercises 15 - 33 odd, (a) sketch the graph of the equation, (b) identify the vertex, (c) compare the graph to the graph of $sqr(x) = x^2$ by stating any transformations used.

15. $f(x) = x^2 - 4$

a.

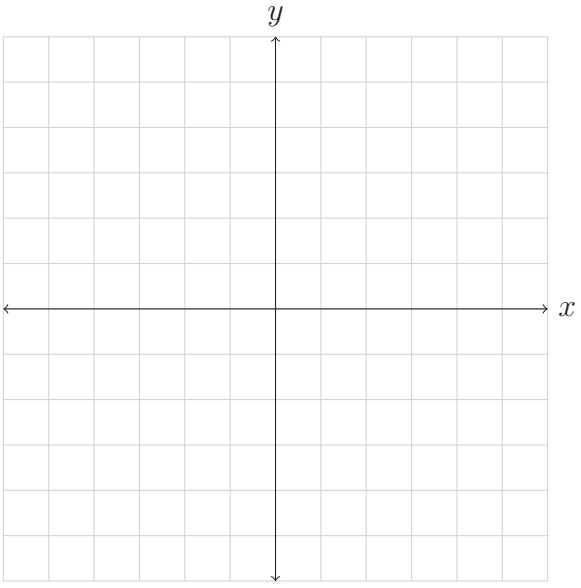



b. What is the vertex?

c. Compare $f(x)$ to $sqr(x) = x^2$.

19. $f(x) = (x - 3)^2$

a.

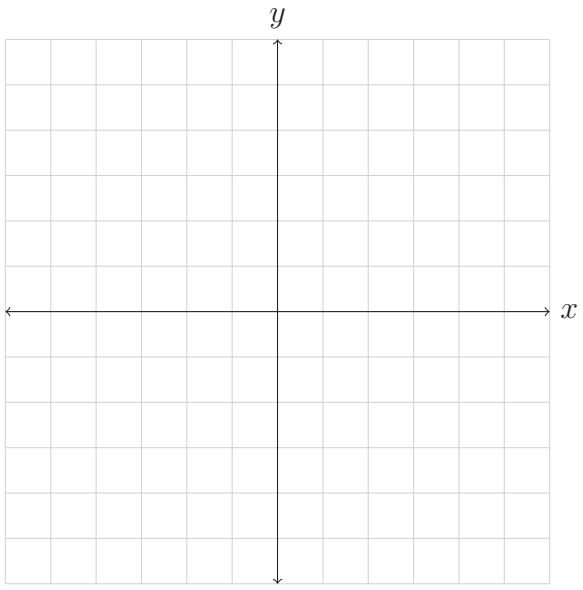



b. What is the vertex?

c. Compare $f(x)$ to $sqr(x) = x^2$.

25. $f(x) = (x + 2)^2$

a.

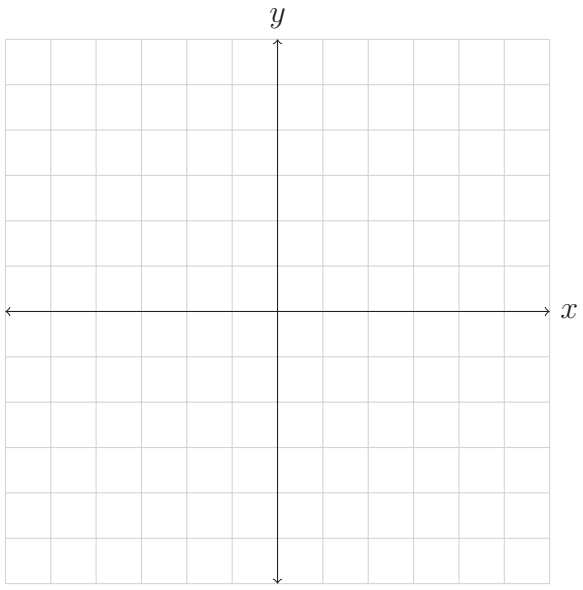



b. What is the vertex?

c. Compare $f(x)$ to $sqr(x) = x^2$.

27. $f(x) = (x+1)^2 - 2$

a.

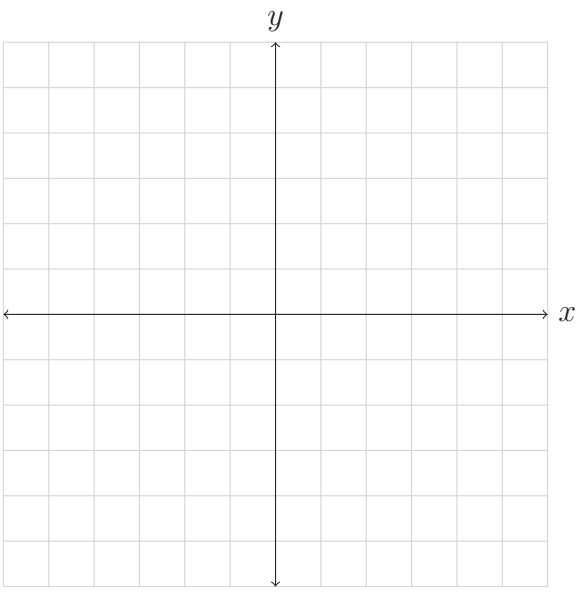



b. What is the vertex?

c. Compare $f(x)$ to $sqr(x) = x^2$.

29. $f(x) = (x-1)^2 + 2$

a.




b. What is the vertex?

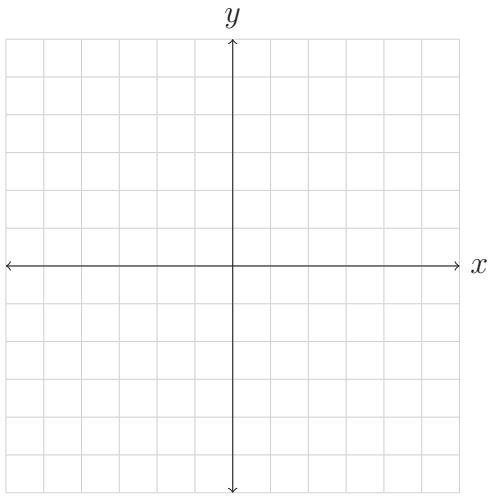
c. Compare $f(x)$ to $sqr(x) = x^2$.

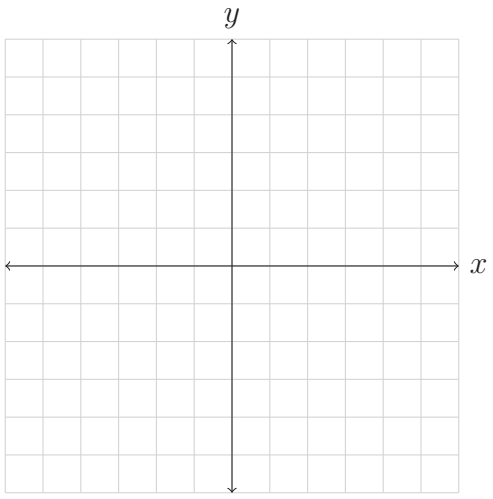
**Vertex Form:**

In exercises 41 and 43, write the vertex form of a parabola that satisfies the conditions given. Then write the equation in the form $f(x) = ax^2 + bx + c$.

41. Vertex (3,4) and $a = 3$.

43. Vertex (5,-2) and $a = -\frac{1}{2}$.



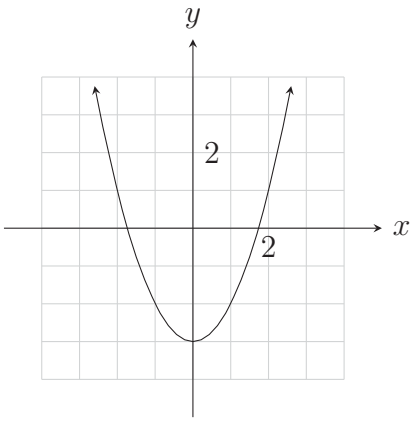

In exercises 45 and 47, write the vertex form of a parabola that satisfies the conditions given. Assume that $a = \pm 1$.

45. Concave up, vertex (1,2).

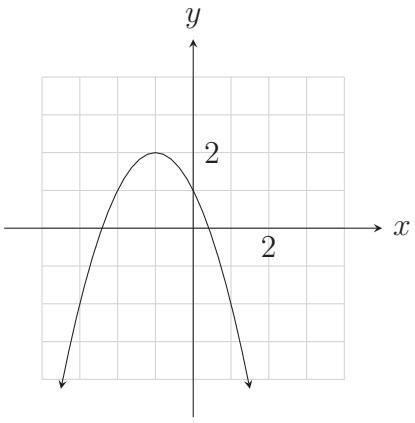
47. Concave down, vertex (0,-3).

In exercises 49 and 51, determine the vertex form of the parabola shown. Assume that $a = \pm 1$.

49.




51.




**Completing the Square:**

In exercises 61 - 77 odd, complete the square to rewrite the function in vertex form. Then identify the vertex.

61. $f(x) = x^2 + 2x$

65. $f(x) = x^2 + 2x - 3$

63. $f(x) = x^2 - 4x$

67. $f(x) = x^2 - 4x + 5$

69. $f(x) = x^2 + 3x - 2$

73. $f(x) = 3x^2 + 6x - 1$

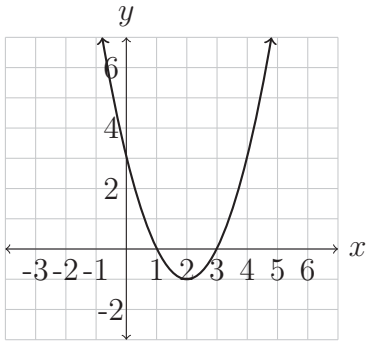
71. $f(x) = x^2 - 7x + 1$

77. $f(x) = -2x^2 - 8x + 5$

**Supplemental Problems:**

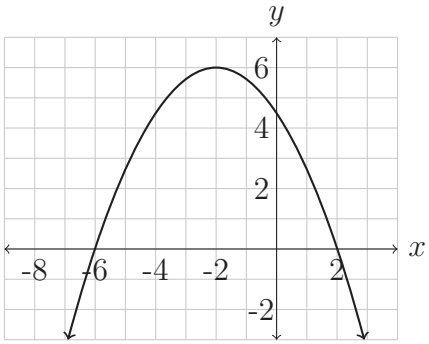
S1. Use interval notation to express domain and range of the quadratic functions graphed below.

a.




The graph of $y = m(x)$.

b.




The graph of $y = n(x)$.

S2. Graph the quadratic function $f(x) = -0.4x^2 + 5x + 15$ on your graphing calculator. Be sure to find a viewing window that allows you to see the vertex and all intercepts.

a. Use either the min or max key to estimate the coordinates of the vertex of $y = f(x)$.

b. Use function notation to state the vertex as an input and output in the function $f$.

c. Use the calculator to determine the horizontal intercepts of $y = f(x)$.

d. Use the trace key and substitute $x = 0$ to find the vertical intercept of $y = f(x)$.

e. Use interval notation to express the domain and range of $f$.

**Solutions to Supplemental Problems:**

S1a. The domain of $m$ is $(-\infty, \infty)$ and the range is $[-1, \infty)$.

S1b. The domain of $n$ is $(-\infty, \infty)$ and the range is $(-\infty, 6]$.

S2a. The vertex is $(-6.25, 30.625)$.

S2b. $f(-6.25) = 30.625$

S2c. The horizontal intercepts are $(-2.5, 0)$ and $(15, 0)$.

S2d. The vertical intercept is $(0, 15)$.

S2e. The domain of $f$ is $(-\infty, \infty)$ and the range is $(-\infty, 30.625]$.