Exercises 45 - 56 give a set of points in the *xy*-plane. Determine if *y* is a function of *x*. If so, state the domain and range.

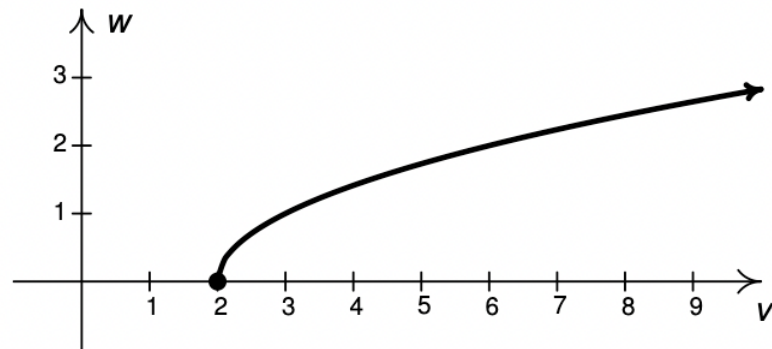45. $\{(-3, 9),\ (-2, 4),\ (-1, 1),\ (0, 0),\ (1, 1),\ (2, 4),\ (3, 9)\}$

46. $\{(-3, 0), (1, 6), (2, -3), (4, 2), (-5, 6), (4, -9), (6, 2)\}$

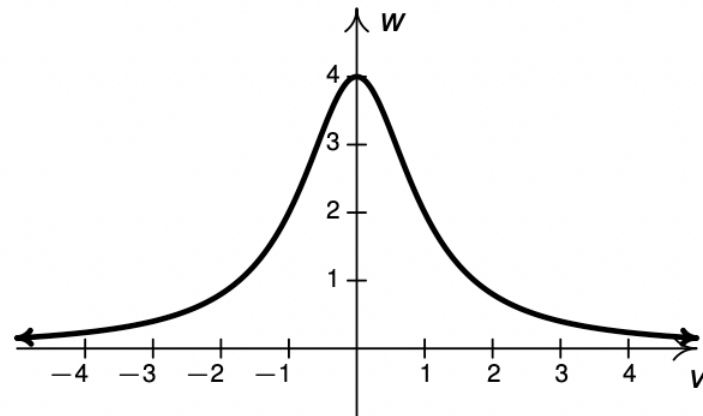47. $\{(-3, 0), (-7, 6), (5, 5), (6, 4), (4, 9), (3, 0)\}$

48. $\{(1, 2), (4, 4), (9, 6), (16, 8), (25, 10), (36, 12), ...\}$

In Exercises 63 - 66, determine whether or not the graph suggests w is a function of v . For the ones which do, state the domain and range.
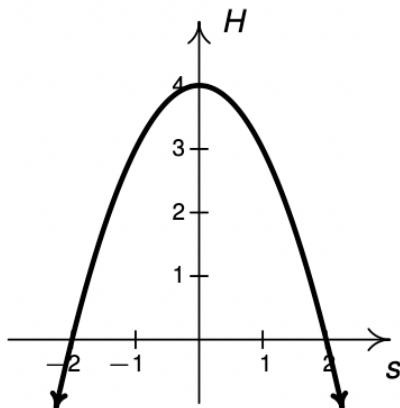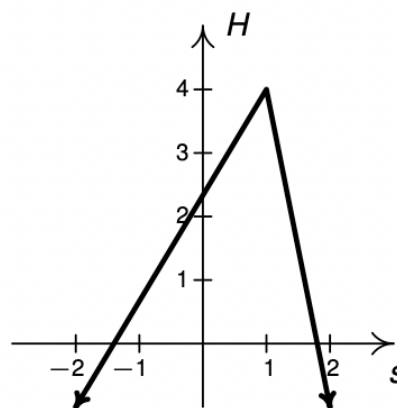
63.

64.

In Exercises 73 - 76, determine whether or not the graph suggests H is a function of s. For the ones which do, state the domain and range.
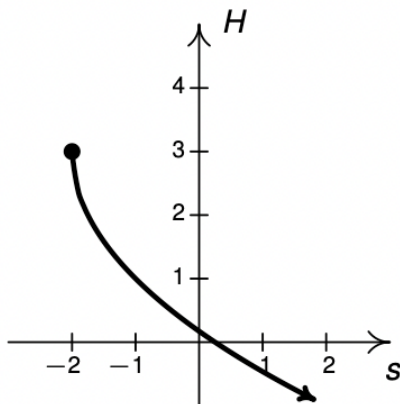
73.

74.

75.

76.

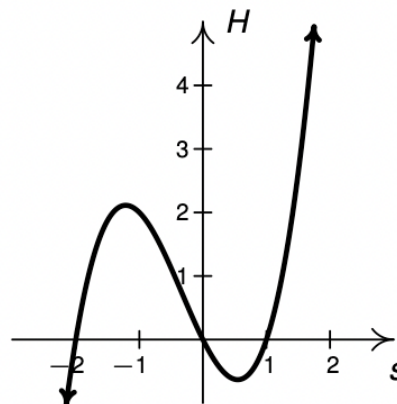110. The area enclosed by a circle, in square meters, is a function of its radius r, when measured in meters. This function is represented by the formula $A(r) = \pi r^2$ for $r > 0$. Find $A(2)$ and solve $A(r) = 16\pi$. Interpret your answers to each. Why is r restricted to $r > 0$?

122. Sketch the graph of a function with domain $(-\infty, 3) \cup [4, 5)$ with range $\{2\} \cup (5, \infty)$.

21. A landscaping company charges $45 per cubic yard of mulch plus a delivery charge of $20. Find an expression for a linear function $C(x)$ which computes the total cost in dollars to deliver x cubic yards of mulch.

22. A plumber charges $50 for a service call plus $80 per hour. If she spends no longer than 8 hours a day at any one site, find an expression for a linear function $C(t)$ that computes her total daily charges in dollars as a function of the amount of time spent in hours, t at any one given location.

31. A restaurant offers a buffet which costs $15 per person. For parties of 10 or more people, a group discount applies, and the cost is $12.50 per person. Write a piecewise-defined linear function which calculates the total bill $T(n)$ of a party of n people who all choose the buffet.

40. Prove that for all linear functions L with with slope 3, $L(120) = L(100) + 60$.

In Exercises 1 - 9, graph the quadratic function. Find the vertex and axis intercepts of each graph, if they exist. State the domain and range, identify the maximum or minimum, and list the intervals over which the function is increasing or decreasing. If the function is given in general form, convert it into standard form; if it is given in standard form, convert it into general form.
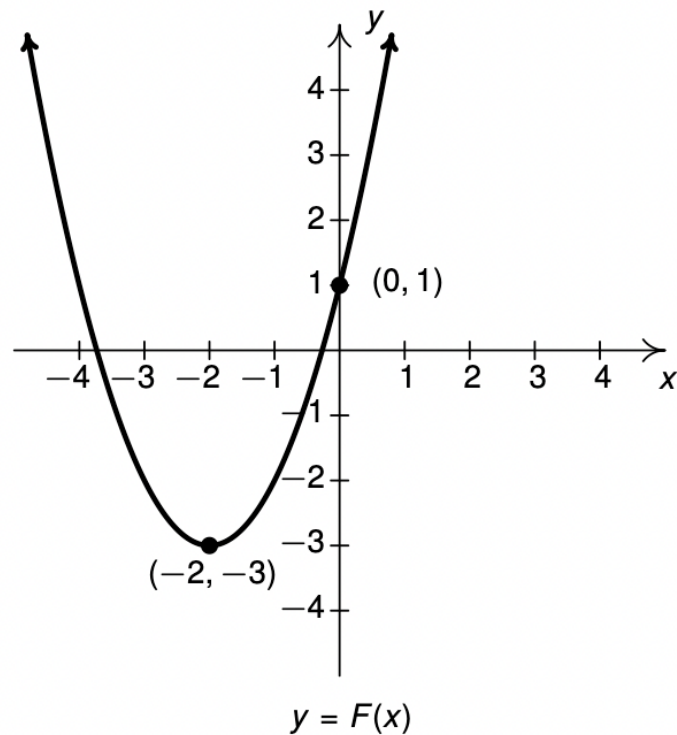
1. $f(x) = x^2 + 2$

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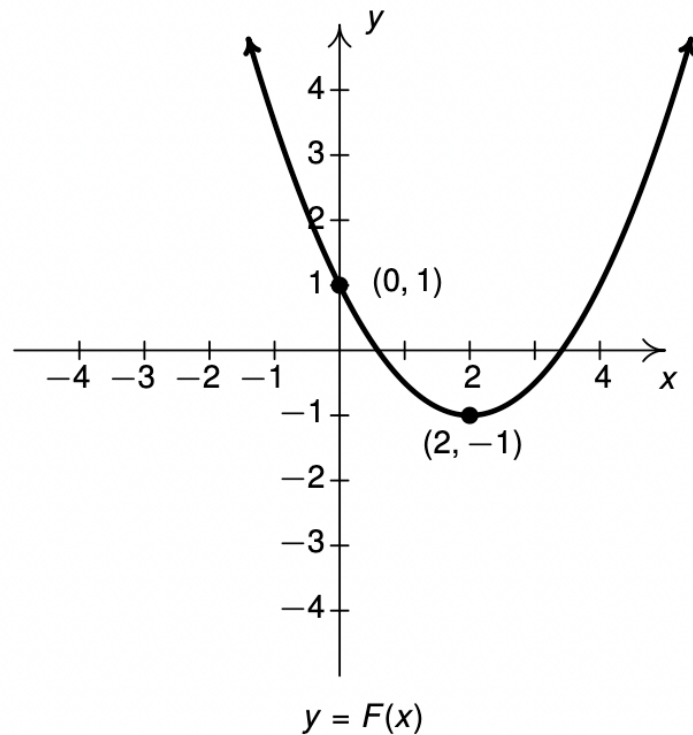
3. $f(x) = x^2 - 2x - 8$

In Exercises 10 - 13, find a formula for each function below in the form $F(x) = a(x - h)^2 + k$.

10.

$y = F(x)$

11.

$y = F(x)$

41. What is the largest rectangular area one can enclose with 14 inches of string?

38. Suppose $C(x) = x^2 - 10x + 27$ represents the costs, in *hundreds*, to produce x *thousand* pens. How many pens should be produced to minimize the cost? What is this minimum cost?

39. Skippy wishes to plant a vegetable garden along one side of his house. In his garage, he found 32 linear feet of fencing. Since one side of the garden will border the house, Skippy doesn't need fencing along that side. What are the dimensions of the garden which will maximize the area of the garden? What is the maximum area of the garden?

12. A 10% salt solution is to be mixed with pure water to produce 75 gallons of a 3% salt solution. How much of each are needed?

9. A local buffet charges $7.50 per person for the basic buffet and $9.25 for the deluxe buffet (which includes crab legs.) If 27 diners went out to eat and the total bill was $227.00 before taxes, how many chose the basic buffet and how many chose the deluxe buffet?

5. $\begin{cases} \frac{1}{2}x - \frac{1}{3}y = -1 \\ 2y - 3x = 6 \end{cases}$

6. $\begin{cases} x + 4y = 6 \\ \frac{1}{12}x + \frac{1}{3}y = \frac{1}{2} \end{cases}$

7. $\begin{cases} 3y - \frac{3}{2}x = -\frac{15}{2} \\ \frac{1}{2}x - y = \frac{3}{2} \end{cases}$

8. $\begin{cases} \frac{5}{6}x + \frac{5}{3}y = -\frac{7}{3} \\ -\frac{10}{3}x - \frac{20}{3}y = 10 \end{cases}$