Example 1.1.1. Suppose Skippy records the outdoor temperature every two hours starting at 6 a.m. and ending at 6 p.m. and summarizes the data in the table below:

time (hours after 6 a.m.)	outdoor temperature in degrees Fahrenheit
0	64
2	67
4	75
6	80
8	83
10	83
12	82

1. Explain why the recorded outdoor temperature is a function of the corresponding time.
2. Is time a function of the outdoor temperature? Explain.
3. Let f be the function which matches time to the corresponding recorded outdoor temperature.

   (a) Find and interpret the following:

   - $f(2)$
   - $f(4)$
   - $f(2+4)$
   - $f(2)+f(4)$
   - $f(2)+4$

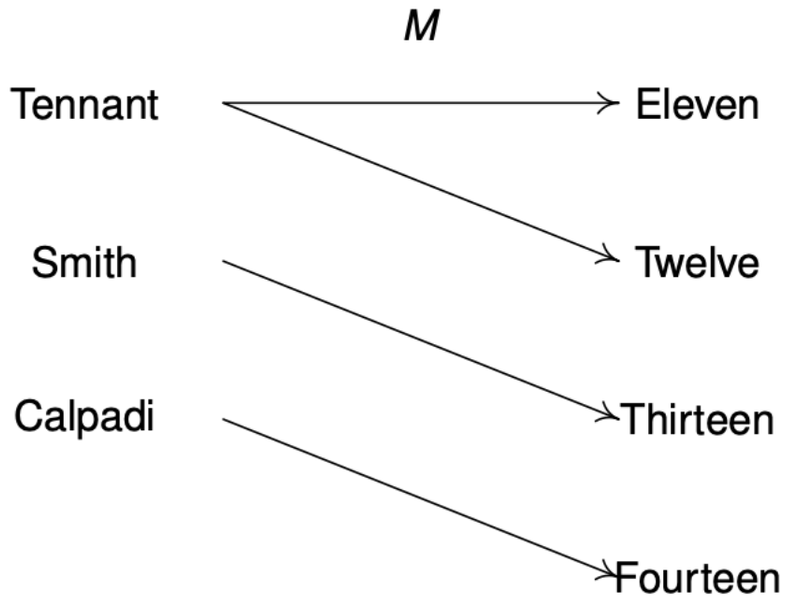
   (b) Solve and interpret $f(t) = 83$.

   (c) State the range of f. What is lowest recorded temperature of the day? The highest?

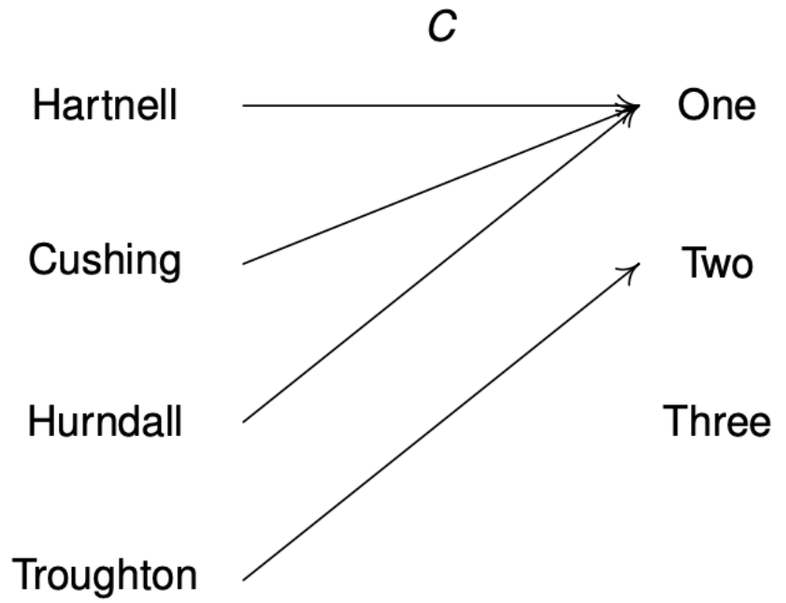
1.1.4 Exercises

In Exercises 1 - 2, determine whether or not the mapping diagram represents a function. Explain your reasoning. If the mapping does represent a function, state the domain, range, and represent the function as a set of ordered pairs.

1.

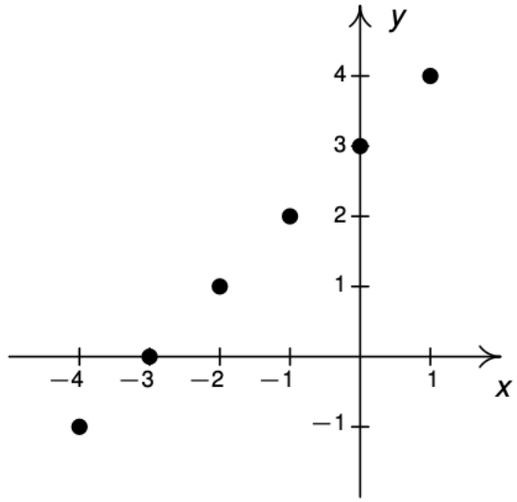


2.

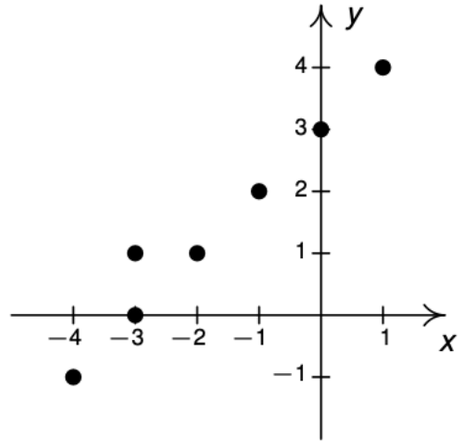


In Exercises 58 - 61, determine whether or not the graph suggests y is a function of x. For the ones which do, state the domain and range.

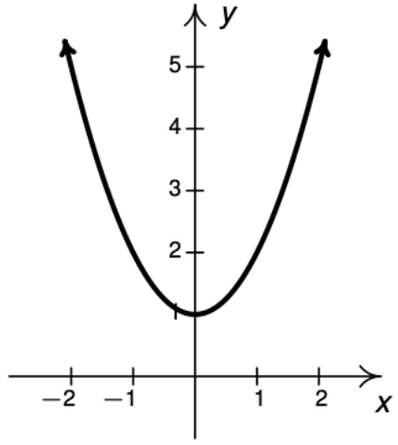
58.



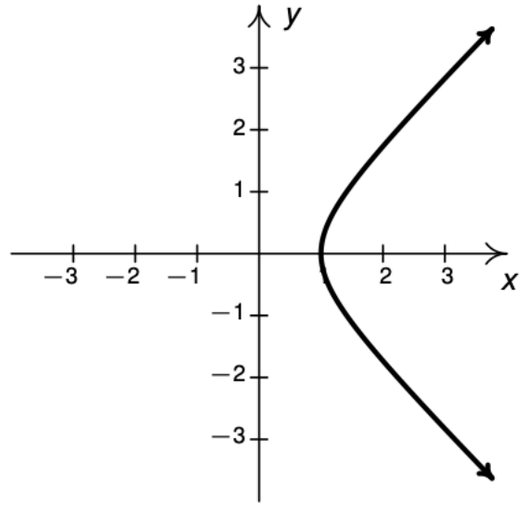
59.



60.



61.



1.2.5 Exercises

In Exercises 1 - 6, graph the function. Find the slope and axis intercepts, if any.

1. $f(x) = 2x - 1$
2. $g(t) = 3 - t$
3. $F(w) = 3$
4. $G(s) = 0$
5. $h(t) = \frac{2}{3}t + \frac{1}{3}$
6. $j(w) = \dfrac{1 - w}{2}$

In Exercises 7 - 10, graph the function. Find the domain, range, and axis intercepts, if any.

7. $f(x) = \begin{cases} 4 - x & \text{if} \quad x \leq 3 \\ 2 & \text{if} \quad x > 3 \end{cases}$
8. $g(x) = \begin{cases} 2 - x & \text{if} \quad x < 2 \\ x - 2 & \text{if} \quad x \geq 2 \end{cases}$
9. $F(t) = \begin{cases} -2t - 4 & \text{if} \quad t < 0 \\ 3t & \text{if} \quad t \geq 0 \end{cases}$
10. $G(t) = \begin{cases} -3 & \text{if} \quad t < 0 \\ 2t - 3 & \text{if} \quad 0 < t < 3 \\ 3 & \text{if} \quad t > 3 \end{cases}$

19. Jeff can walk comfortably at 3 miles per hour. Find an expression for a linear function $d(t)$ that represents the total distance Jeff can walk in t hours, assuming he doesn't take any breaks.

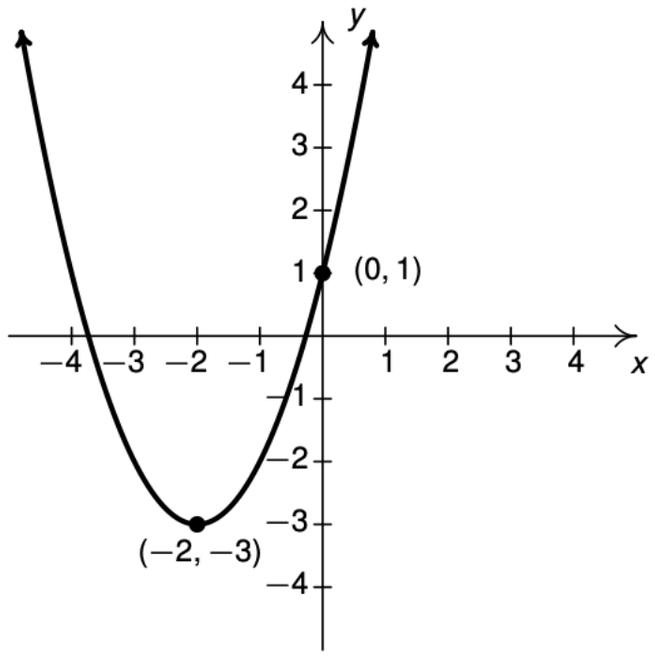
20. Carl can stuff 6 envelopes per *minute*. Find an expression for a linear function $E(t)$ that represents the total number of envelopes Carl can stuff after t *hours*, assuming he doesn't take any breaks.

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.

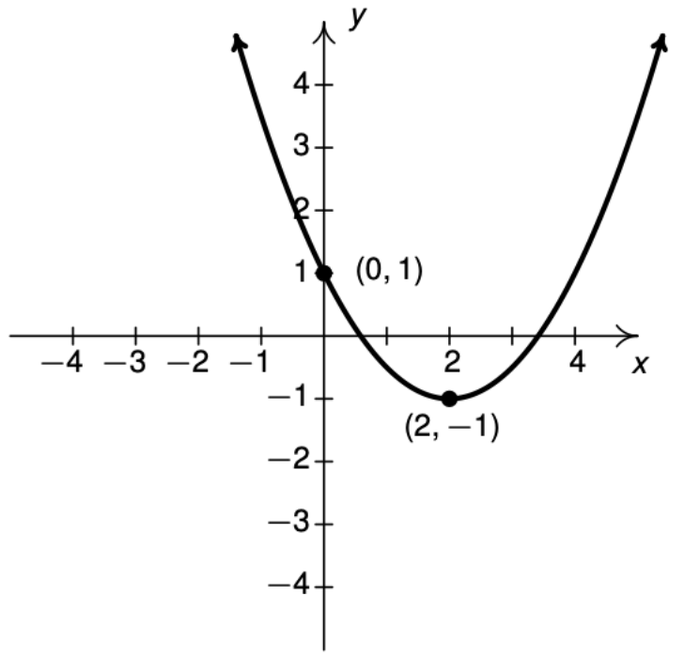
22. A plumber charges \$50 for a service call plus \$80 per hour. If she spends no longer than 8 hours a day at any one site, find an expression for a linear function $C(t)$ that computes her total daily charges in dollars as a function of the amount of time spent in hours, t at any one given location.

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

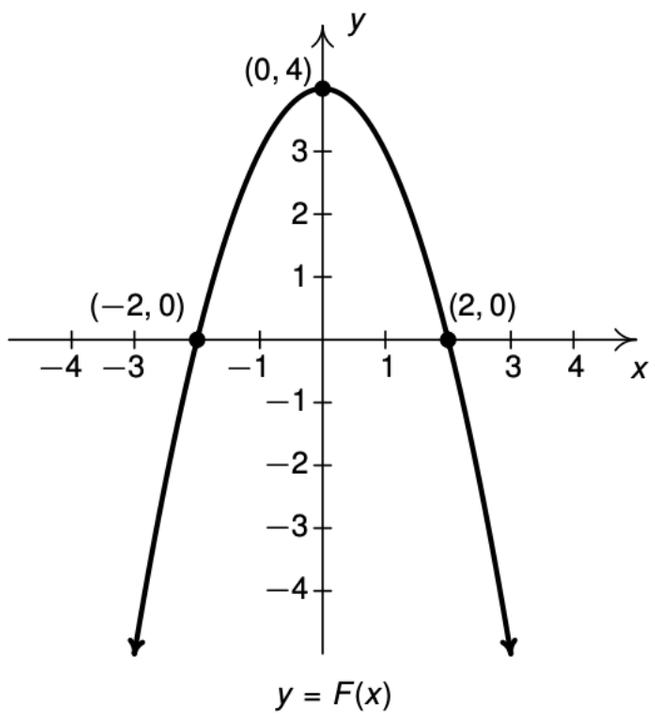
10.



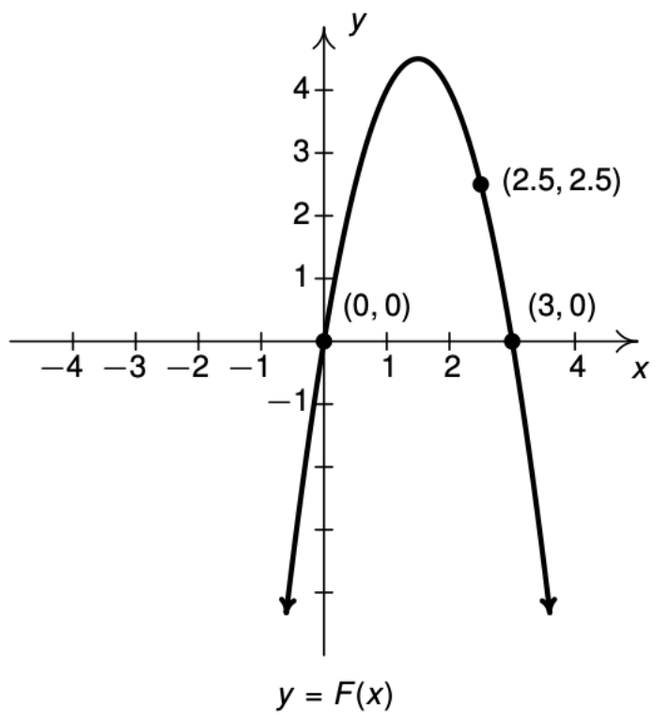
11.



12.



13.



In Exercises 14 - 29, solve the inequality. Write your answer using interval notation.

14. $x^2 + 2x - 3 \geq 0$

15. $16x^2 + 8x + 1 > 0$

16. $t^2 + 9 < 6t$

17. $9t^2 + 16 \geq 24t$

18. $u^2 + 4 \leq 4u$

19. $u^2 + 1 < 0$

20. $3x^2 \leq 11x + 4$

21. $x > x^2$

22. $2t^2 - 4t - 1 > 0$

23. $5t + 4 \leq 3t^2$

24. $2 \leq |x^2 - 9| < 9$

25. $x^2 \leq |4x - 3|$

26. $t^2 + t + 1 \geq 0$

27. $t^2 \geq |t|$

28. $x|x + 5| \geq -6$

29. $x|x - 3| < 2$