Odd-Numbered Answers to Exercise Set 1.2: Functions and Graphs

1. No, the graph does not represent a function.

3. Yes, the graph represents a function.

5. Yes, the graph represents a function.

7. No, the graph does not represent a function.

9. Yes, the graph represents a function.

11. (a) No, the set of points does not represent a function. The graph does not pass the vertical line test at $x = 2$.

13. If each $x$ value is paired with only one $y$ value, then the set of points represents a function. If an $x$ value is paired with more than one $y$ value (i.e. two or more coordinates have the same $x$ value but different $y$ values), then the set of points does not represent a function.

15. (a) Domain: $[-4, 6]$
(b) Range: $[-3, 9]$
(c) $y$-intercept: $-3$
(d) $f(-2) = 3$
   $f(0) = -3$
   $f(4) = 9$
   $f(6) = 3$
(e) $x = -4, x = 4$
(f) $f$ is increasing on the interval $(0, 4)$.
(g) $f$ is decreasing on the interval $(-4, 0) \cup (4, 6)$.
(h) The maximum value of the function is 9.
(i) The minimum value of the function is $-3$.

17. (a) Domain: $(-\infty, 6)$
   (b) Range: $(-\infty, 5]$
   (c) The function has two $x$-intercepts.
   (d) $g(-2) = 1$
   $g(0) = 5$
   $g(2) = -1$
   $g(4) = 1$
   $g(6)$ is undefined
   (e) $g(-2)$ is greater than $g(3)$, since $1 > 0$.
   (f) $g$ is increasing on the interval $(-\infty, 0) \cup (2, 6)$.
   (g) $g$ is increasing on the interval $(0, 2)$.

19. (a) Domain: $(-\infty, \infty)$
   (b) $x$-intercept: 4; $y$-intercept: 6
   (c) $x$     $f(x) = -\frac{3}{2}x + 6$

   |   |  
   |---|---|
   | -2 | 9  |
   | -1 | $\frac{15}{2} = 7.5$ |
   | 0  | 6  |
   | 1  | $\frac{9}{2} = 4.5$ |
   | 2  | 3  |

21. (a) Domain: $[-1, 3)$
   (b) $x$-intercept: $\frac{5}{3}$; $y$-intercept: $-5$
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21. (c) \[
\begin{array}{c|c}
  x & h(x) = 3x - 5 \\
  \hline
  -1 & -8 \\
  0 & -5 \\
  1 & -2 \\
  2 & 1 \\
  3 & \text{undefined} \\
\end{array}
\]

(b) x-intercept: 3; y-intercept: 3

23. (a) Domain: \((−∞, ∞)\)

(b) x-intercept: 3; y-intercept: 3

(c) \[
\begin{array}{c|c}
  x & g(x) = |x - 3| \\
  \hline
  1 & 2 \\
  2 & 1 \\
  3 & 0 \\
  4 & 1 \\
  5 & 2 \\
\end{array}
\]

25. (a) Domain: \([3, ∞)\)

(b) x-intercept: 3; y-intercept: None

(c) \[
\begin{array}{c|c}
  x & f(x) = \sqrt{x - 3} \\
  \hline
  3 & 0 \\
  4 & 1 \\
  5 & \sqrt{2} ≈ 1.4 \\
  7 & 2 \\
  12 & 3 \\
\end{array}
\]

27. (a) Domain: \((−∞, ∞)\)

(b) x-intercepts: 0, 4; y-intercept: 0

(c) \[
\begin{array}{c|c|c}
  x & F(x) = x^2 - 4x \\
  \hline
  -1 & 5 \\
  0 & 0 \\
  1 & -3 \\
  2 & -4 \\
  3 & -3 \\
\end{array}
\]
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29. (a) Domain: \((-\infty, \infty)\)
    (b) \(x\)-intercept: \(-1\); \(y\)-intercept: 1
    (c) \(x\) \(f(x) = x^3 + 1\)
        \[
        \begin{array}{c|c}
        x & f(x) \\
        \hline
        -2 & -7 \\
        -1 & 0 \\
        0 & 1 \\
        1 & 2 \\
        2 & 9 \\
        \end{array}
        \]

31. (a) Domain: \((-\infty, 0) \cup (0, \infty)\)
    (b) \(x\)-intercepts: None; \(y\)-intercept: None
    (c) \(f(x) = \frac{12}{x}\)
        \[
        \begin{array}{c|c}
        x & f(x) \\
        \hline
        -6 & -2 \\
        -4 & -3 \\
        -3 & -4 \\
        -2 & -6 \\
        2 & 6 \\
        3 & 4 \\
        4 & 3 \\
        5 & 2 \\
        \end{array}
        \]

33. (a) Domain: \([-2, 5]\)
    (b) \(y\)-intercept: 4
    (c) \(f(x) = \frac{12}{x}\)
        \[
        \begin{array}{c|c}
        x & f(x) \\
        \hline
        -2 & 0 \\
        -1 & 2 \\
        0 & 4 \\
        1 & 2 \\
        2 & 1 \\
        3 & 0 \\
        4 & -1 \\
        5 & -2 \\
        \end{array}
        \]
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35. (a) Domain: \((-\infty, \infty)\)
   (b) \(y\)-intercept: \(-5\)
   (c) 
   \[
   \begin{array}{c|c}
   x & f(x) \\
   \hline
   -6 & 3 \\
   -2 & -5 \\
   2 & -5 \\
   \end{array}
   \]

37. (a) Domain: \((-\infty, \infty)\)
   (b) \(y\)-intercept: 1
   (c) 
   \[
   \begin{array}{c|c}
   x & f(x) \\
   \hline
   -3 & 4 \\
   0 & 1 \\
   1 & 2 \\
   2 & 5 \\
   \end{array}
   \]

39. (a) Domain: \((-\infty, \infty)\)
   (b) \(y\)-intercept: 0
   (c) 
   \[
   \begin{array}{c|c}
   x & f(x) \\
   \hline
   -6 & -6 \\
   -3 & -3 \\
   -2 & 4 \\
   -1 & 1 \\
   0 & 0 \\
   1 & 1 \\
   2 & 4 \\
   5 & 4 \\
   \end{array}
   \]

41. (a) origin
   (b) \(y\)-axis

43. \((3, -6)\)

45. Odd

47. Even

49. Neither