Tell whether \( x \) and \( y \) show direct variation, inverse variation, or neither.

1. \( y = 2x + 3 \)
2. \( y = \frac{x}{3} \)
3. \( x = \frac{3}{y} \)
4. \( \frac{1}{2}xy = 2 \)

The variables \( x \) and \( y \) vary inversely. Use the given values to write an equation relating \( x \) and \( y \). Then find \( y \) when \( x = 0.5 \).

5. \( x = 4, y = 6 \)
6. \( x = 2, y = \frac{5}{2} \)
7. \( x = 48, y = \frac{1}{12} \)

8. \( x = -3, y = 2 \)
9. \( x = \frac{4}{3}, y = \frac{3}{2} \)
10. \( x = \frac{1}{2}, y = \frac{1}{3} \)

Determine whether \( x \) and \( y \) show direct variation, inverse variation, or neither.

11. \[
\begin{array}{cccc}
  x & 1 & 2 & 3 \\
  y & 1 & 4 & 9 \\
\end{array}
\]
12. \[
\begin{array}{cccc}
  x & 2 & 5 & 8 & 15 \\
  y & 60 & 24 & 15 & 8 \\
\end{array}
\]
13. \[
\begin{array}{cccc}
  x & 1 & 4 & 7 & 10 \\
  y & 7.5 & 30 & 52.5 & 75 \\
\end{array}
\]

The variable \( z \) varies jointly with \( x \) and \( y \). Use the given values to write an equation relating \( x \), \( y \), and \( z \). Then find \( z \) when \( x = 4 \) and \( y = 7 \).

14. \( x = 3, y = 5, z = 30 \)
15. \( x = 6, y = \frac{1}{2}, z = 24 \)
16. \( x = \frac{3}{2}, y = 18, z = 9 \)

In Exercises 17–20, use the following information.

**Simple Interest** The simple interest \( I \) (in dollars) for a savings account is jointly proportional to the product of the time \( t \) (in years) and the principal \( P \) (in dollars). After fifteen months, the interest on a principal of $2500 is $78.13.

17. Find the constant of variation \( k \).
18. Write an equation that relates \( I \), \( t \), and \( P \).
19. What will the interest \( I \) be after ten years?
20. What does the constant of variation \( k \) represent?

In Exercises 21–23, use the following information.

**Boyle’s Law** Boyle’s Law states that for a constant temperature, the pressure \( p \) of a gas varies inversely with its volume \( V \). A sample of oxygen gas has a volume of 50.25 cubic milliliters at a pressure of 20.6 atmospheres.

21. Find the constant of variation \( k \).
22. Write an equation that relates \( p \) and \( V \).
23. Find the volume of the oxygen gas if the pressure changes to 15.2 atmospheres.
Find the vertical and horizontal asymptotes of the graph of the function.

1. \( f(x) = \frac{4}{x - 2} + 1 \)
2. \( f(x) = \frac{2x + 2}{3x - 4} \)
3. \( f(x) = \frac{x + 1}{2x - 3} \)
4. \( f(x) = \frac{4x}{2x + 3} \)
5. \( f(x) = \frac{2x - 1}{x - 2} \)
6. \( f(x) = \frac{6x - 1}{3x + 6} \)

Graph the function. State the domain and range.

7. \( f(x) = \frac{2}{x + 3} \)
8. \( f(x) = \frac{x + 1}{x - 3} \)
9. \( f(x) = \frac{4x}{2x - 1} \)
10. \( f(x) = \frac{-3}{x + 2} \)
11. \( f(x) = \frac{3x - 2}{2x + 1} \)
12. \( f(x) = \frac{4}{3x - 2} - 1 \)

In Exercises 13–16, use the following information.

Phone Bill Your local phone company charges a $65 installation fee and a monthly fee of $32. Let \( x \) represent the number of months of phone service.

13. Write an equation that represents the total cost \( C \).
14. Write an equation that represents the average cost \( A \) per month.
15. Graph the model in Exercise 14.
16. How many months until the average cost per month is $33.25?