

OBJECTIVES AND EXAMPLES

Lesson 1-1 Evaluate a function.

- Find $f(-2)$ if $f(x) = 3x^2 - 2x + 4$.
Evaluate the expression $3x^2 - 2x + 4$ for $x = -2$.

$$\begin{aligned} f(-2) &= 3(-2)^2 - 2(-2) + 4 \\ &= 12 + 4 + 4 \\ &= 20 \end{aligned}$$

Lesson 1-2 Perform operations with functions.

- Given $f(x) = 4x + 2$ and $g(x) = x^2 - 2x$,
find $(f + g)(x)$ and $(f \cdot g)(x)$.

$$\begin{aligned} (f + g)(x) &= f(x) + g(x) \\ &= 4x + 2 + x^2 - 2x \\ &= x^2 + 2x + 2 \end{aligned}$$

$$\begin{aligned} (f \cdot g)(x) &= f(x) \cdot g(x) \\ &= (4x + 2)(x^2 - 2x) \\ &= 4x^3 - 6x^2 - 4x \end{aligned}$$

Lesson 1-2 Find composite functions.

- Given $f(x) = 2x^2 + 4x$ and $g(x) = 2x - 1$,
find $[f \circ g](x)$ and $[g \circ f](x)$.

$$\begin{aligned} [f \circ g](x) &= f(g(x)) \\ &= f(2x - 1) \\ &= 2(2x - 1)^2 + 4(2x - 1) \\ &= 2(4x^2 - 4x + 1) + 8x - 4 \\ &= 8x^2 + 6 \end{aligned}$$

$$\begin{aligned} [g \circ f](x) &= g(f(x)) \\ &= g(2x^2 + 4x) \\ &= 2(2x^2 + 4x) - 1 \\ &= 4x^2 + 8x - 1 \end{aligned}$$

REVIEW EXERCISES

Evaluate each function for the given value.

- $f(4)$ if $f(x) = 5x - 10$
- $g(2)$ if $g(x) = 7 - x^2$
- $f(-3)$ if $g(x) = 4x^2 - 4x + 9$
- $h(0.2)$ if $h(x) = 6 - 2x^3$
- $g\left(\frac{1}{3}\right)$ if $g(x) = \frac{2}{5x}$
- $k(4c)$ if $k(x) = x^2 + 2x - 4$
- Find $f(m + 1)$ if $f(x) = |x^2 + 3x|$.

Find $(f + g)[x]$, $(f - g)[x]$, $(f \cdot g)[x]$, and $\left(\frac{f}{g}\right)[x]$ for each $f(x)$ and $g(x)$.

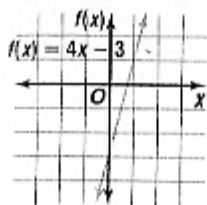
- | | |
|--|---|
| 18. $f(x) = 6x - 4$
$g(x) = 2$ | 19. $f(x) = x^2 + 4x$
$g(x) = x - 2$ |
| 20. $f(x) = 4 - x^2$
$g(x) = 3x$ | 21. $f(x) = x^2 + 7x + 12$
$g(x) = x + 4$ |
| 22. $f(x) = x^2 - 1$
$g(x) = x + 1$ | 23. $f(x) = x^2 - 4x$
$g(x) = \frac{4}{x - 4}$ |

Find $[f \circ g][x]$ and $[g \circ f][x]$ for each $f(x)$ and $g(x)$.

- | | |
|--|--|
| 24. $f(x) = x^2 - 4$
$g(x) = 2x$ | 25. $f(x) = 0.5x + 5$
$g(x) = 3x^2$ |
| 26. $f(x) = 2x^2 + 6$
$g(x) = 3x$ | 27. $f(x) = 6 + x$
$g(x) = x^2 - x + 1$ |
| 28. $f(x) = x^2 - 5$
$g(x) = x + 1$ | 29. $f(x) = 3 - x$
$g(x) = 2x^2 + 10$ |
30. State the domain of $[f \circ g](x)$ for $f(x) = \sqrt{x - 16}$ and $g(x) = 5 - x$.

OBJECTIVES AND EXAMPLES

Lesson 1-3 Graph linear equations.

 Graph $f(x) = 4x - 3$.

Lesson 1-4 Write linear equations using the slope-intercept, point-slope, and standard forms of the equation.

Write the slope-intercept form of the equation of the line that has a slope of 24 and passes through the point at (1, 2).

$$y = mx + b \quad \text{Slope-intercept form}$$

$$2 = -4(1) + b \quad y = 2, x = 1, m = -4$$

$$6 = b \quad \text{Solve for } b.$$

 The equation for the line is $y = -4x + 6$.

Lesson 1-5 Write equations of parallel and perpendicular lines.

 Write the standard form of the equation of the line that is parallel to the graph of $y = 2x - 3$ and passes through the point at (1, -1).

$$y - y_1 = m(x - x_1) \quad \text{Point-slope form}$$

$$y - (-1) = 2(x - 1) \quad y_1 = -1, m = 2, x = 1$$

$$2x - y - 3 = 0$$

 Write the standard form of the equation of the line that is perpendicular to the graph of $y = 2x - 3$ and passes through the point at (6, -1).

$$y - y_1 = m(x - x_1) \quad y_1 = -1,$$

$$y - (-1) = -\frac{1}{2}(x - 6) \quad m = -\frac{1}{2}, x = 6$$

$$x + 2y - 2 = 0$$

REVIEW EXERCISES

Graph each equation.

- | | |
|--------------------|----------------------------|
| 31. $y = 3x + 6$ | 32. $y = 8 - 5x$ |
| 33. $y - 15 = 0$ | 34. $0 = 2x - y - 7$ |
| 35. $y = 2x$ | 36. $y = -8x - 2$ |
| 37. $7x + 2y = -5$ | 38. $y = \frac{1}{4}x - 6$ |

Write an equation in slope-intercept form for each line described.

39. slope = 2, y-intercept = -3
40. slope = -1, y-intercept = 1
41. slope = $\frac{1}{2}$, passes through the point at (-5, 2)
42. passes through A(-4, 2) and B(2, 5)
43. x-intercept = 1, y-intercept = -4
44. horizontal and passes through the point at (3, -1)
45. the x-axis
46. slope = 0.1, x-intercept = 1

Write the standard form of the equation of the line that is parallel to the graph of the given equation and passes through the point with the given coordinates.

47. $y = x + 1$; (1, 1)
48. $y = \frac{1}{3}x - 2$; (-1, 6)
49. $2x + y = 1$; (-3, 2)

Write the standard form of the equation of the line that is perpendicular to the graph of the given equation and passes through the point with the given coordinates.

50. $y = -2x + \frac{1}{4}$; (4, -8)
51. $4x - 2y + 2 = 0$; (1, 4)
52. $x = -8$; (4, -6)