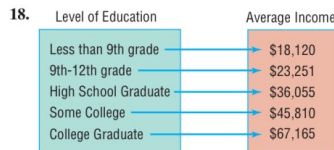
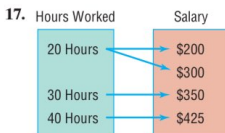
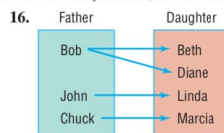
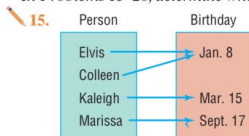




Skill Building

2.1

In Problems 15–26, determine whether each relation represents a function. For each function, state the domain and range.



19. $\{(2, 6), (-3, 6), (4, 9), (2, 10)\}$ 20. $\{(-2, 5), (-1, 3), (3, 7), (4, 12)\}$ 21. $\{(1, 3), (2, 3), (3, 3), (4, 3)\}$
 22. $\{(0, -2), (1, 3), (2, 3), (3, 7)\}$ 23. $\{(-2, 4), (-2, 6), (0, 3), (3, 7)\}$ 24. $\{(-4, 4), (-3, 3), (-2, 2), (-1, 1), (-4, 0)\}$
 25. $\{(-2, 4), (-1, 1), (0, 0), (1, 1)\}$ 26. $\{(-2, 16), (-1, 4), (0, 3), (1, 4)\}$

In Problems 27–38, determine whether the equation defines y as a function of x .

27. $y = x^2$ 28. $y = x^3$ 29. $y = \frac{1}{x}$ 30. $y = |x|$
 31. $y^2 = 4 - x^2$ 32. $y = \pm\sqrt{1 - 2x}$ 33. $x = y^2$ 34. $x + y^2 = 1$
 35. $y = 2x^2 - 3x + 4$ 36. $y = \frac{3x - 1}{x + 2}$ 37. $2x^2 + 3y^2 = 1$ 38. $x^2 - 4y^2 = 1$

In Problems 39–46, find the following for each function:

- (a) $f(0)$ (b) $f(1)$ (c) $f(-1)$ (d) $f(-x)$ (e) $-f(x)$ (f) $f(x + 1)$ (g) $f(2x)$ (h) $f(x + h)$
39. $f(x) = 3x^2 + 2x - 4$ 40. $f(x) = -2x^2 + x - 1$ 41. $f(x) = \frac{x}{x^2 + 1}$ 42. $f(x) = \frac{x^2 - 1}{x + 4}$
 43. $f(x) = |x| + 4$ 44. $f(x) = \sqrt{x^2 + x}$ 45. $f(x) = \frac{2x + 1}{3x - 5}$ 46. $f(x) = 1 - \frac{1}{(x + 2)^2}$

In Problems 47–62, find the domain of each function.

47. $f(x) = -5x + 4$ 48. $f(x) = x^2 + 2$ 49. $f(x) = \frac{x}{x^2 + 1}$ 50. $f(x) = \frac{x^2}{x^2 + 1}$
 51. $g(x) = \frac{x}{x^2 - 16}$ 52. $h(x) = \frac{2x}{x^2 - 4}$ 53. $F(x) = \frac{x - 2}{x^3 + x}$ 54. $G(x) = \frac{x + 4}{x^3 - 4x}$
 55. $h(x) = \sqrt{3x - 12}$ 56. $G(x) = \sqrt{1 - x}$ 57. $f(x) = \frac{4}{\sqrt{x - 9}}$ 58. $f(x) = \frac{x}{\sqrt{x - 4}}$
 59. $p(x) = \sqrt{\frac{2}{x - 1}}$ 60. $q(x) = \sqrt{-x - 2}$ 61. $P(t) = \frac{\sqrt{t - 4}}{3t - 21}$ 62. $h(z) = \frac{\sqrt{z + 3}}{z - 2}$

In Problems 63–72, for the given functions f and g , find the following. For parts (a)–(d), also find the domain.

- (a) $(f + g)(x)$ (b) $(f - g)(x)$ (c) $(f \cdot g)(x)$ (d) $\left(\frac{f}{g}\right)(x)$
 (e) $(f + g)(3)$ (f) $(f - g)(4)$ (g) $(f \cdot g)(2)$ (h) $\left(\frac{f}{g}\right)(1)$
63. $f(x) = 3x + 4$; $g(x) = 2x - 3$ 64. $f(x) = 2x + 1$; $g(x) = 3x - 2$
 65. $f(x) = x - 1$; $g(x) = 2x^2$ 66. $f(x) = 2x^2 + 3$; $g(x) = 4x^3 + 1$