[10-06-25-L8]

10.2 Exercises

Let $f(x) = 3 + 2x$ and $g(x) = x^2 - 2$. Find the following.

1. $f(1)$	**2.** $f(4)$	**3.** $g(2)$	**4.** $g(0)$
5. $g(-1)$	**6.** $g(-3)$	**7.** $f(-8)$	**8.** $f(-5)$
9. $f(-2) + f(-3)$	**10.** $f(1) + f(4)$	**11.** $g(1) + g(0)$	**12.** $g(-2) + g(-4)$
13. $g(5) + f(-1)$	**14.** $f(7) + g(-3)$	**15.** $f(-2) - g(1)$	**16.** $g(-5) - f(-1)$

Let $f = \{(-1, 2), (0, 1), (1, 5), (2, 5)\}$ and $g = \{(0, 4), (1, 3), (2, 2), (6, 1)\}$. Find the following.

17. $f(-1)$	**18.** $f(1)$	**19.** $g(0)$	**20.** $g(6)$
21. $g(6) + f(2)$	**22.** $f(0) - g(1)$	**23.** $f(0) - g(6)$	**24.** $g(2) - f(-1)$
25. $(f + g)(1)$	**26.** $(f + g)(2)$	**27.** $(fg)(2)$	**28.** $(fg)(1)$

Find an expression for $f(x)$ in each of the following. Then find $f(-2)$ and $f(1)$. See Example 2.

29. $4x + y = 9$	**30.** $3x - y = 1$	**31.** $3x - 5y = 7$	**32.** $2x + 3y = 4$
33. $x^2 - y = 4$	**34.** $x^2 + y = 3$	**35.** $x = y^3$	**36.** $x + 2 = y^3$

Let $f(x) = x^2 + 2x$ and $g(x) = 2 + 7x$. Find the following. See Example 4.

37. $(f + g)(2)$	**38.** $(f - g)(1)$	**39.** $(fg)(0)$	**40.** $\left(\frac{f}{g}\right)(1)$
41. $(f - g)(-3)$	**42.** $(fg)(-2)$	**43.** $\left(\frac{f}{g}\right)(-2)$	**44.** $(fg)(3)$
45. $(f + g)(r)$	**46.** $\left(\frac{f}{g}\right)(z)$	**47.** $(fg)(3z)$	**48.** $(g - f)(5p)$

Let $f(x) = -x^2 + 2x + 1$ and $g(x) = 4x - 3$. Find the following. See Examples 3 and 5.

49. $f(r)$	**50.** $g(a)$	**51.** $f(z - 1)$	**52.** $f(2p + 1)$
53. $g(2q - 5)$	**54.** $(f \circ g)(-1)$	**55.** $(g \circ f)(0)$	**56.** $(g \circ f)(-2)$
57. $(f \circ g)(1)$	**58.** $(g \circ f)(2)$	**59.** $(g \circ f)(-3)$	**60.** $(f \circ g)(m)$
61. $(g \circ f)(r)$	**62.** $(g \circ f)(a + 2)$	**63.** $(f \circ g)(p + 1)$	**64.** $(g \circ f)(m + 1)$

In each of the following exercises, find (a) $f(x + h)$; (b) $f(x + h) - f(x)$; (c) $\frac{f(x + h) - f(x)}{h}$. (This quotient is important in calculus.) See Example 3.

65. $f(x) = 9x - 1$	**66.** $f(x) = 3x + 2$	**67.** $f(x) = 2x^2$	**68.** $f(x) = 5 - x^2$
69. $f(x) = -4x^2 + 6x$	**70.** $f(x) = 3x^2 - 5x$	**71.** $f(x) = 3 + x^3$	**72.** $f(x) = 1 - x^3$

In Exercises 73–76 write a function expressing the total cost $C(x)$, to manufacture x items.

73. The cost is \$7 per cheap watch.

74. \$12 is the cost to manufacture a basic calculator.

75. It costs a fixed \$5000 to set up a press to print a book, with an additional charge of \$2 per book printed.

76. A factory owner pays \$7200 to get the factory ready to make flower pots, with an additional charge of \$3 per pot.

77. A car rental agency charges \$35 plus 20¢ a mile (or a fraction of a mile) for a one-day rental. Let $f(x)$ be the cost for a rental of x miles. Find the following.

(a) $f(8)$ (b) $f\left(27\frac{1}{2}\right)$ (c) $f\left(27\frac{3}{4}\right)$ (d) $f(15)$

(e) Graph $f(x)$. (f) Does $f(x)$ represent a function?

78. The cost to rent a paint sprayer is \$3 per hour or portion of an hour, with a fixed \$2 cleaning charge. Let $f(x)$ be the cost to rent a sprayer for x hours. Find the following.

(a) $f(1)$ (b) $f(3.8)$ (c) $f(4.2)$ (d) Graph $f(x)$.

(e) Does $f(x)$ represent a function?

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1. 5 **3.** 2 **5.** -1 **7.** -13 **9.** -4 **11.** -3 **13.** 24 **15.** 0 **17.** 2
19. 4 **21.** 6 **23.** 0 **25.** 8 **27.** 10 **29.** $f(x) = 9 - 4x$; 17; 5
31. $f(x) = (3x - 7)/5$; $-13/5$; $-4/5$ **33.** $f(x) = x^2 - 4$; 0; -3 **35.** $f(x) = \sqrt[3]{x}$; $\sqrt[3]{-2}$; 1
37. 24 **39.** 0 **41.** 22 **43.** 0 **45.** $r^2 + 9r + 2$ **47.** $189z^3 + 144z^2 + 12z$
49. $-r^2 + 2r + 1$ **51.** $-z^2 + 4z - 2$ **53.** $8q - 23$ **55.** 1 **57.** 2 **59.** -59
61. $-4r^2 + 8r + 1$ **63.** $-16p^2 + 2$ **65.** (a) $9x + 9h - 1$ (b) $9h$ (c) 9 **67.** (a) $2x^2 + 4xh + 2h^2$ (b) $4xh + 2h^2$ (c) $4x + 2h$ **69.** (a) $-4x^2 - 8xh - 4h^2 + 6x + 6h$ (b) $-8xh - 4h^2 + 6h$ (c) $-8x - 4h + 6$ **71.** (a) $3 + x^3 + 3x^2h + 3xh^2 + h^3$ (b) $3x^2h + 3xh^2 + h^3$ (c) $3x^2 + 3xh + h^2$ **73.** $C(x) = 7x$ **75.** $C(x) = 5000 + 2x$ **77.** (a) \$36.60 (b) \$40.60 (c) \$40.60 (d) \$38.00 (e) $f(x)$

(f) Yes