1. Find the domain of $f(x) = \sqrt{x+2} + \sqrt{2-x}$.

   A. $(-\infty, \infty)$

   B. $[-2, 2]$

   C. $(-\infty, -2] \cup [2, \infty)$

   D. $(-\infty, -2]$

   E. $[2, \infty)$

2. If $f(x) = -2x^2 + 3$, simplify the difference quotient $\dfrac{f(2+h) - f(2)}{h}$ if $h \neq 0$.

   A. -4

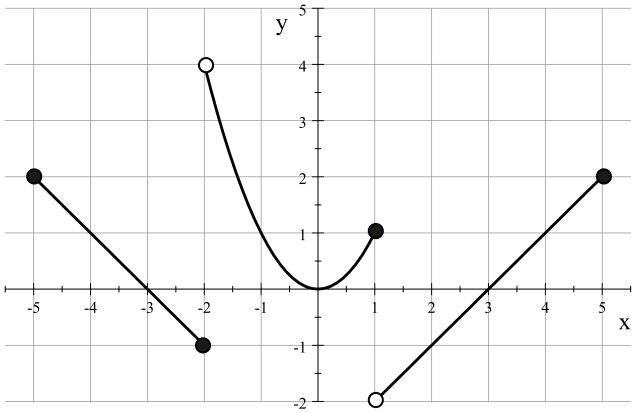
   B. $-4 + h$

   C. $-4 - h$

   D. $-8 - 2h$

   E. $-8 + 2h$

3. For the graph shown below, determine all values x such that $f(x) > 1$.



   A. $[-5, -4) \cup (-2, -1) \cup (4, 5)$

   B. $[-5, -4) \cup (-2, -1) \cup (4, 5]$

   C. $(-5, -4) \cup (-2, -1) \cup (4, 5]$

   D. $[-5, -4) \cup [-2, -1) \cup (4, 5]$

   E. $(-5, -4) \cup (-2, -1) \cup (4, 5)$

4. An open box of height 2 feet is to have a volume of 10 ft^3. Let x denote the length of the base and y the width. Express the total number S of square feet of material needed as a function of x.

   A. $S(x) = 4x + \dfrac{20}{x} + 5$

   B. $S(x) = 2x + \dfrac{10}{x} + 5$

   C. $S(x) = 2x + \dfrac{20}{x} + 10$

   D. $S(x) = 4x + \dfrac{10}{x} + 10$

   E. $S(x) = 2x + 10x + 10$

5. If the point $P(3, 9)$ is on the graph of a function f, find the corresponding point on the graph of $y = \frac{1}{3} f\left(\frac{1}{2}x\right) - 1$.

   A. $\left(\frac{3}{2}, 26\right)$

   B. $(6, 2)$

   C. $\left(0, \frac{9}{2}\right)$

   D. $\left(8, \frac{9}{2}\right)$

   E. $(8, 18)$

6. Find the domain of the piecewise-defined function

$$f(x) = \begin{cases} x^2 & -4 < x \leq -1 \\ 2x + 1 & -1 < x \leq 3 \\ 1 - x & x > 4 \end{cases}$$

   A. $(-\infty, \infty)$

   B. $(-4, -1) \cup (-1, 3] \cup (4, \infty)$

   C. $(-4, 3] \cup (4, \infty)$

   D. $(-4, \infty)$

   E. $(-4, 4)$

7. Find the standard equation of a parabola that has a vertex at $(3, 5)$ and an x-intercept at -4.

   A. $y = (x-3)^2 + 5$

   B. $y = -(x-3)^2 + 5$

   C. $y = -\frac{5}{49}(x-3)^2 + 5$

   D. $y = -4(x-3)^2 + 5$

   E. $y = -\frac{1}{4}(x-3)^2 + 5$

8. Find the maximum or minimum value of $f(x) = -2x^2 - 4x - 11$.

   A. maximum value of -1

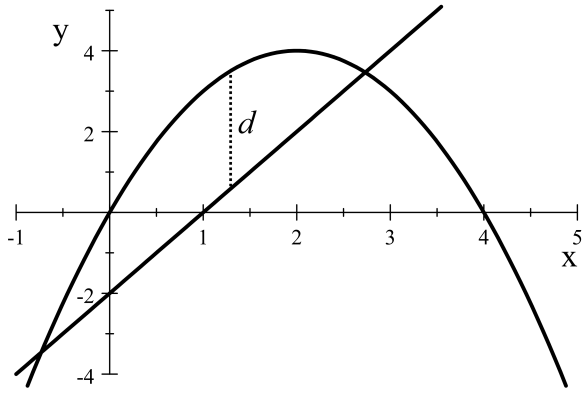
   B. minimum value of -1

   C. maximum value of -9

   D. minimum value of -9

   E. the function has no minimum or maximum

9. Find the maximum vertical distance d between the parabola $y = 4x - x^2$ and the line $y = 2x - 2$.



   A. 1

   B. 1.5

   C. 2

   D. 2.5

   E. 3

10. An object is projected vertically upward from the top of a building with an initial velocity of 144 ft/sec. Its distance $s(t)$ in feet above the ground after t seconds is given by $s(t) = -16t^2 + 144t + 100$. Find the object's maximum distance above the ground.

    A. 100 feet

    B. 144 feet

    C. 328 feet

    D. 424 feet

    E. 512 feet

11. Which of the following would result in a transformation of the graph of f of a vertical stretch of 2, and horizontal compression of 1/3?

    A. $y = 2f(3x)$

    B. $y = \frac{1}{2}f(3x)$

    C. $y = 2f\left(\frac{1}{3}x\right)$

    D. $y = \frac{1}{2}f\left(\frac{1}{3}x\right)$

    E. $y = 3f(2x)$

12. A fire has started in a dry open field and is spreading in the form of a circle. If the radius of the circle increases at a rate of 8 feet/sec, express the total area of the fire A as a function of time t.

    A. $A(t) = 8t$

    B. $A(t) = 8\pi t$

    C. $A(t) = 8\pi t^2$

    D. $A(t) = 64\pi t$

    E. $A(t) = 64\pi t^2$

13. If $f(x) = \dfrac{x-1}{x-2}$ and $g(x) = \dfrac{x-3}{x-4}$, find $(f \circ g)(x)$

A. $\dfrac{1}{5-x}$

B. $\dfrac{-7}{-x-11}$

C. $\dfrac{x-4}{x-5}$

D. $\dfrac{2x-4}{2x-6}$

E. $\dfrac{2x-7}{3x-11}$

14. Find all values of x such that $f(x) > 0$.

$$f(x) = x^3(x+1)^2(x-1)$$

A. $(-\infty, -1) \cup (0, 1)$

B. $(-1, 0) \cup (1, \infty)$

C. $(-\infty, -1) \cup (-1, 0) \cup (1, \infty)$

D. $(-\infty, 0) \cup (1, \infty)$

E. $(-1, 0) \cup (0, 1)$

15. Six years ago a house was purchased for \$179,000. This year it was appraised at \$215,000. Assuming that the value of the house after its purchase is a linear function of time in years, approximate how many years after purchase was the house worth \$193,000?

A. 1

B. 2

C. 3

D. 4

E. 5

Answers:

1. B
2. D
3. B
4. A
5. B
6. C
7. C
8. C
9. E
10. D
11. A
12. E
13. A
14. C
15. B