1. If $f(x) = -x^2 - 3$ and $g(x) = 4 - x$, find $(f - g)(-2)$
   A. -1
   B. -3
   C. -7
   D. -11
   E. -13

2. Find the standard equation of a parabola that has x-intercepts of -4 and 6 and the lowest point has a y-coordinate of -7.
   A. $y = (x-1)^2 - 7$
   B. $y = \frac{7}{25}(x-1)^2 - 7$
   C. $y = \frac{25}{7}(x-1)^2 - 7$
   D. $y = 7(x-1)^2 - 7$
   E. none of the above

3. The point $P(4, -6)$ is on the graph of $f(x)$ If $y = -3f\left(\frac{1}{2}x\right) - 5$, find the corresponding point on the graph of y.
   A. $(8, 33)$
   B. $(2, 13)$
   C. $(8, -3)$
   D. $(2, 33)$
   E. $(8, 13)$

4. Find the domain of $f(x) = \sqrt{x(x+2)(x-5)}$
   A. $(-\infty, -2] \cup [-2, 0] \cup [0, 5] \cup [5, \infty)$
   B. $(-\infty, -2] \cup [5, \infty)$
   C. $(-\infty, -2] \cup [0, 5]$
   D. $[-2, 0] \cup [5, \infty)$
   E. None of the above

5. Express $f(x) = 4x^2 - 16x + 3$ in the form $a(x-h)^2 + k$

   A. $f(x) = 4(x-2)^2 - 13$

   B. $f(x) = 4(x-8)^2 - 61$

   C. $f(x) = 4(x-4)^2 - 13$

   D. $f(x) = 4(x-2)^2 - 5$

   E. $f(x) = 4(x-4)^2 - 5$

6. A spherical balloon is being inflated at a rate of $\frac{3}{2}$ ft^3/min. Express the radius of the balloon as a function of time t in minutes, assuming that $r = 0$ when $t = 0$.

   A. $r(t) = \sqrt[3]{\dfrac{9t}{8\pi}}$

   B. $r(t) = \sqrt[3]{\dfrac{2t}{\pi}}$

   C. $t(t) = \sqrt[3]{2\pi t}$

   D. $r(t) = \sqrt[3]{\dfrac{8\pi t}{9}}$

   E. None of the above

7. Simplify the difference quotient $\dfrac{f(x+h) - f(x)}{h}$ for $f(x) = 3x^2 - 5x + 2$.

   A. $6x - 5$

   B. $6x - 5 + h$

   C. $6x - 6h$

   D. $6x - 5 + 3h$

   E. $6xh - 5h + 3h^2$

8. Find all values of x such that $f(x) > 0$ if $f(x) = x(x-2)^2(x+3)(x+5)$.

   A. $(-\infty, -5) \cup (-3, 0) \cup (0, 2)$

   B. $(-5, -3) \cup (0, \infty)$

   C. $(-5, -3) \cup (0, 2) \cup (2, \infty)$

   D. $(-\infty, -5) \cup (-3, 0) \cup (2, \infty)$

   E. $(-\infty, -5) \cup (-3, 0) \cup (0, 2)$

9. A company plans to manufacture a container having the shape of a right circular cylinder, open at the top, and having a capacity of 24π cubic inches. If the cost of the material for the bottom is \$0.30/in^2 and that for the curved side is \$0.10/in^2, express the total cost C of the material as a function of the radius r of the base of the container.

   A. $C(r) = \dfrac{3\pi(r^3+16)}{10r}$

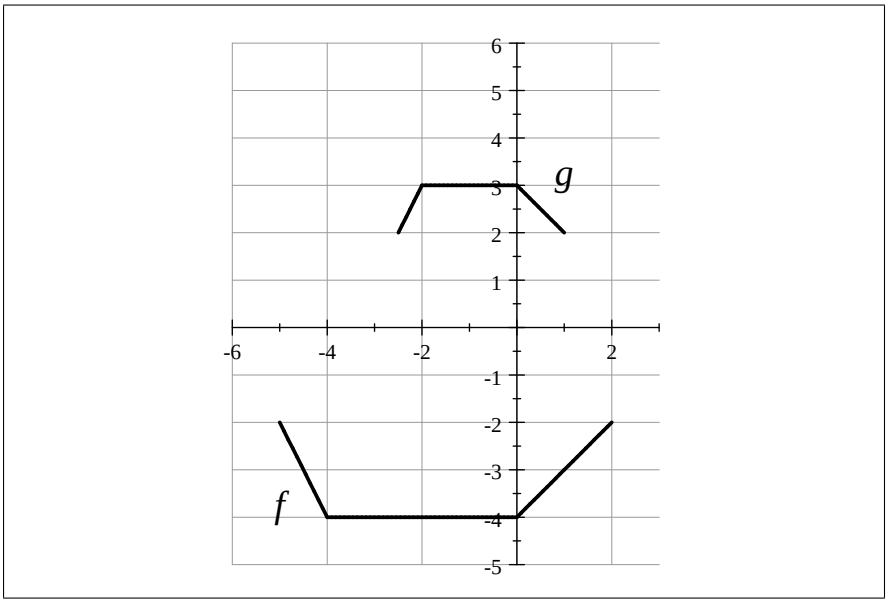
   B. $C(r) = \frac{3}{10}\pi(r^2+16r)$

   C. $C(r) = \frac{51}{10}\pi r^2$

   D. $C(r) = \frac{3}{10}\left(r^2 - \dfrac{16}{r^2}\right)$

   E. None of the above

10. The graph of f is shown below. Using properties of symmetry, shifts, stretches, and/or reflections, find an equation for g based on the graph of f.



   A. $g(x) = -\frac{1}{2}f(\frac{1}{2}x) + 4$

   B. $g(x) = -2f(2x) + 1$

   C. $g(x) = -\frac{1}{2}f(2x)$

   D. $g(x) = -2f(\frac{1}{2}x)$

   E. $g(x) = -\frac{1}{2}f(2x) + 1$

11. A cable television firm serves 1000 households and charges \$50 per month. A marketing survey indicates that each decrease of \$5 in the monthly charge will add 100 new customers. Determine the revenue function R as a function of the monthly charge, x.

A. $R(x) = 1000x + 100x^2$

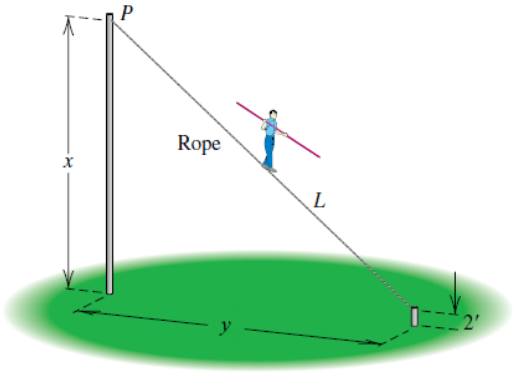
B. $R(x) = 50000 - 500x^2$

C. $R(x) = 50000 + 9750x - 500x^2$

D. $R(x) = 6000x - 500x^2$

E. $R(x) = 2000x - 20x^2$

12. Two poles are set 100 feet apart as shown in the figure. Express the length L of the rope as a function of the distance x from point P to the ground



A. $L(x) = \sqrt{10000 + x^2}$

B. $L(x) = \sqrt{10000 - x^2}$

C. $L(x) = \sqrt{10004 - 4x + x^2}$

D. $L(x) = \sqrt{9996 + 4x + x^2}$

E. $L(x) = \sqrt{9996 - 4x - x^2}$

13. Given $f(x) = \dfrac{x-4}{x+1}$ and $g(x) = \dfrac{x-5}{x-1}$, find the domain of $(f \circ g)(x)$.

A. $(-\infty, 3) \cup (3, \infty)$

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

C. $\left(-\infty, -\frac{1}{3}\right) \cup \left(-\frac{1}{3}, \infty\right)$

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

E. $\left(-\infty, -\frac{1}{3}\right) \cup \left(-\frac{1}{3}, 3\right) \cup (3, \infty)$

14. A certain state taxes the first \$500,000 in property value of 1%. All values over \$500,000 is taxes at 2%. Find a piecewise defined function$T$ that specifies the total tax on a property valued at x dollars.

A. $T(x) = \begin{cases} 0.01x & \text{if } x \leq 500,000 \\ 0.02x & \text{if } x > 500,000 \end{cases}$

B. $T(x) = \begin{cases} 0.01x & \text{if } x \leq 500,000 \\ 0.02x + 5000 & \text{if } x > 500,000 \end{cases}$

C. $T(x) = \begin{cases} 0.01x & \text{if } x \leq 500,000 \\ 0.02x - 5000 & \text{if } x > 500,000 \end{cases}$

D. $T(x) = \begin{cases} 0.01x & \text{if } x \leq 500,000 \\ 0.02x + 10,000 & \text{if } x > 500,000 \end{cases}$

E. $T(x) = \begin{cases} 0.01x & \text{if } x \leq 500,000 \\ 0.02x - 10,000 & \text{if } x > 500,000 \end{cases}$

15. Given $f(x) = \sqrt{x+5}$ and $g(x) = \sqrt{3-x}$, find the domain of $\left(\dfrac{g}{f}\right)(x)$.

A. $(-5, 3)$

B. $[-5, 3)$

C. $(-5, 3]$

D. $[-5, 3]$

E. None of the above

16. A ball is thrown upward and travels along a parabolic path described by the equation $s(t) = -16t^2 + 128t + 5$, where s is in feet and t is in seconds. What is the maximum height attained by the ball?

    A. 4 feet

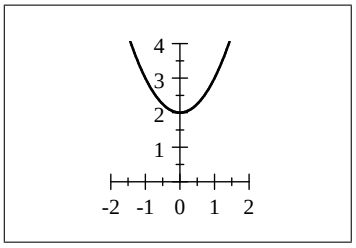
    B. 9 feet

    C. 261 feet

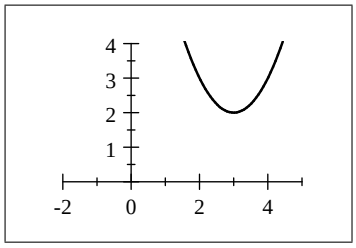
    D. 453 feet

    E. 773 feet

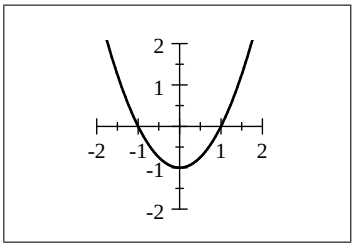
17. If $f(x) = x^4 + 2$ and $g(x) = \sqrt{x-3}$, which of the following would represent the graph of $(f \circ g)(x)$?



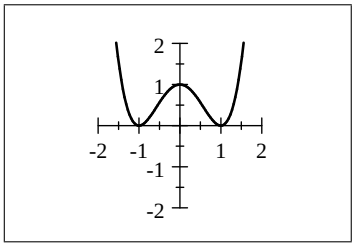
A



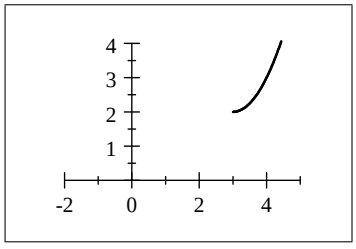
B



C



D



E

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