1. Given $f(x) = x^2 - 3x$ and $g(x) = 2x + 5$, find $f(4) - 2g(-1)$

   A. 1
   B. -2
   C. 11
   D. 7
   E. 6

2. Find the maximum value of $f(x) = 3 + 6x - 2x^2$ on $[-1, 5]$

   A. $\dfrac{3+\sqrt{15}}{2}$
   B. -5
   C. $\dfrac{15}{2}$
   D. $\dfrac{3}{2}$
   E. $\dfrac{9}{2}$

3. The price of raw materials to manufacture a toy car has increased linearly since 2000. In 2003 the costs were \$8.00 per toy car, and in 2006 the costs were \$9.50 per toy car. Find a function for the cost C in terms of the time t in years beginning in the year 2000.

   A. $C(t) = 0.5t + 6.5$
   B. $C(t) = 0.5t$
   C. $C(t) = 0.5t + 8$
   D. $C(t) = 0.5t + 1.5$
   E. $C(t) = 0.5t + 0.5$

4. Several values of two functions f and g are listed in the following tables. Find $(f \circ g)(3)$

x	0	1	2	3	4
$f(x)$	2	3	1	4	0
$g(x)$	1	4	0	2	3

A. 0
B. 1
C. 2
D. 3
E. 4

5. Find a function $g(x)$ that represents the following transformations to the graph of a function $f(x)$.

(a) horizontal stretch of 3
(b) reflection about the x-axis
(c) vertical stretch of 2
(d) vertical shift down 5 units

A. $g(x) = 2f(-3x) - 5$
B. $g(x) = -2f(3x) - 5$
C. $g(x) = -\frac{1}{2}f(3x) - 5$
D. $g(x) = 2f(-\frac{1}{3}x) - 5$
E. $g(x) = -2f(\frac{1}{3}x) - 5$

6. A kangaroo can jump to a maximum height of 10 feet while traveling a horizontal distance of 40 feet. Assuming that the path of the kangaroo's jump is parabolic, which of the equations give could represent the path that the kangaroo travels during one jump?

A. $y = 410 - 40x - x^2$
B. $y = 9 + \frac{1}{80}x - \frac{1}{1600}x^2$
C. $y = x - \frac{1}{40}x^2$
D. $y = 1600x - 40x^2$
E. None of the above

7. Find the range of the piecewise-defined function (HINT: Sketch the graph).

$$f(x) = \begin{cases} x+4 & \text{if } -5 < x \le -1 \\ 4-x^2 & \text{if } -1 < x \le 1 \\ -x-3 & \text{if } 1 < x \le 4 \end{cases}$$

A. $(-5, 4]$

B. $[-7, 4]$

C. $[-7, -4) \cup (-1, 4]$

D. $[-7, -4) \cup (-1, 3) \cup (3, 4]$

E. None of the above

8. A car rental agency can rent every one of its 200 cars at \$30 per day. For each \$1 increase in rate, five fewer cars are rented. Find a function for the revenue R in terms of the new rental price, x, that can be used to determined the rental price that will maximize revenue.

A. $R(x) = (350 - 5x)(x)$

B. $R(x) = (200 - 5x)(x)$

C. $R(x) = (200 - 5x)(30 + x)$

D. $R(x) = 200(30 + x)$

E. $R(x) = 150x$

9. Find the domain of $f(x) = \dfrac{2x\sqrt{x^2-4}}{(x-3)(x+5)\sqrt{2-x}}$

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

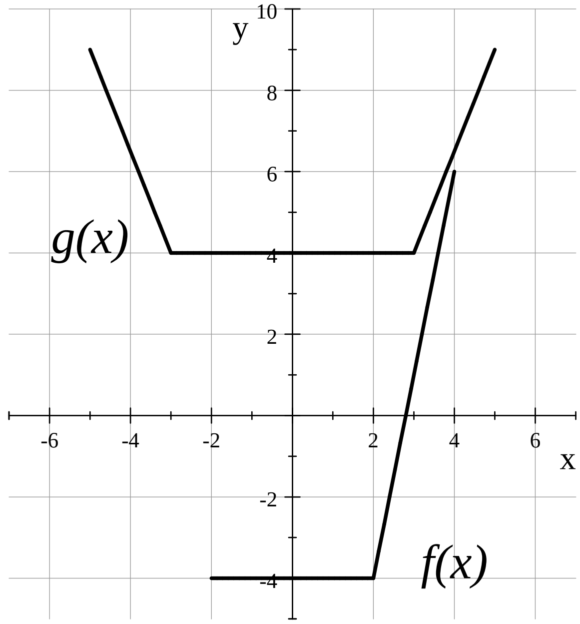
B. $(-\infty, -5) \cup (-5, -2]$

C. $(-5, -2] \cup [2, 3)$

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

E. None of the above

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



A. $g(x) = 2f(|x| - 2) + 8$
B. $g(x) = \frac{1}{2}f(|x| - 1) + 8$
C. $g(x) = \frac{1}{2}f(|x| - 1) + 6$
D. $g(x) = \left|\frac{1}{2}f(x - 2) + 8\right|$
E. $g(x) = \left|\frac{1}{2}f(x + 1)\right| + 6$

11. If $f(x) = \sqrt{2 + x^2}$, and $h \neq 0$, find $\dfrac{f(3+h) - f(3)}{h}$

A. $\dfrac{h}{\sqrt{2 + (3+h)^2} + \sqrt{11}}$

B. $\dfrac{6h}{\sqrt{2 + (3+h)^2} + \sqrt{11}}$

C. $\dfrac{6+h}{\sqrt{2 + (3+h)^2} + \sqrt{11}}$

D. $\dfrac{-h}{\sqrt{2 + (3+h)^2} + \sqrt{11}}$

E. $\dfrac{-6h}{\sqrt{2 + (3+h)^2} + \sqrt{11}}$

12. A salesman makes a 10% commission on all sales up to \$2000. On any sales over \$2000 up to \$4000, he makes a 15% commission. On any sales above \$4000, he makes a 20% commission. Find a piecewise-defined function C to represent the salesman's commission, x.

A. $C(x) = \begin{cases} 0.1x & \text{if } 0 \le x \le 2000 \\ 0.15x & \text{if } 2000 < x \le 4000 \\ 0.2x & \text{if } x > 4000 \end{cases}$

B. $C(x) = \begin{cases} 0.1x & \text{if } 0 \le x \le 2000 \\ 0.15x + 200 & \text{if } 2000 < x \le 4000 \\ 0.2x + 600 & \text{if } x > 4000 \end{cases}$

C. $C(x) = \begin{cases} 0.1x & \text{if } 0 \le x \le 2000 \\ 0.15x + 200 & \text{if } 2000 < x \le 4000 \\ 0.2x + 300 & \text{if } x > 4000 \end{cases}$

D. $C(x) = \begin{cases} 0.1x & \text{if } 0 \le x \le 2000 \\ 0.15x - 100 & \text{if } 2000 < x \le 4000 \\ 0.2x - 300 & \text{if } x > 4000 \end{cases}$

E. $C(x) = \begin{cases} 0.1x & \text{if } 0 \le x \le 2000 \\ 0.15x - 200 & \text{if } 2000 < x \le 4000 \\ 0.2x - 100 & \text{if } x > 4000 \end{cases}$

13. A parabola has x-intercepts at $(-2, 0)$ and $(6, 0)$ and attains a maximum value of $y = 8$. Find the standard equation of the parabola.

A. $y = \frac{1}{2}(x-2)^2 + 8$

B. $y = 2(x-2)^2 + 8$

C. $y = -\frac{1}{2}(x-2)^2 - 8$

D. $y = 2(x+2)^2 - 8$

E. $y = -\frac{1}{2}(x-2)^2 + 8$

14. Two people meet in a certain locations. After the meeting, one of them begins to walk due north at a rate of 3 ft/s. Five seconds after the first person leaves, the second person walks due east at a rate of 2 ft/s. Find a function d for the distance between them with respect to t, the time after the first person left.

A. $d(t) = \sqrt{13t^2 - 40t + 100}$
B. $d(t) = \sqrt{13t^2 + 40t + 100}$
C. $d(t) = \sqrt{13t^2}$
D. $d(t) = \sqrt{5t^2 + 20t + 50}$
E. $d(t) = \sqrt{11t^2 - 20t + 50}$

15. Given the function $f(x) = 2x^2 - 12x + c$, find the value of c so that the minimum value of the function is 10.

A. 1
B. 8
C. 19
D. 28
E. 36

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