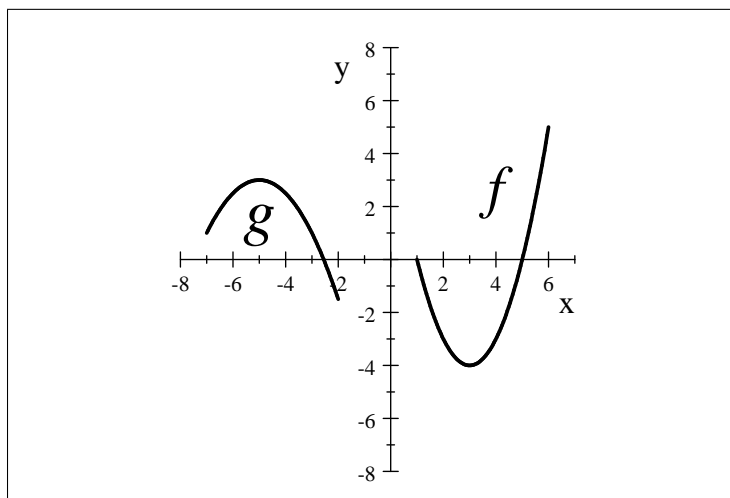


1. Given $f(x) = x^2 - 1$ and $g(x) = 2x + 1$, find $\frac{f(3)}{g(-1) + 3}$.
- A. 1
B. 3
C. 4
D. 6
E. 8
2. Given $f(x) = \frac{1}{x+2}$, evaluate $\frac{f(x) - f(3)}{x-3}$.
- A. 1
B. $\frac{1}{5x+10}$
C. $\frac{-1}{5x+10}$
D. $\frac{1}{x-1}$
E. $\frac{-1}{x+2}$
3. Which of the following functions are even?
- I. $f(x) = x^2 + 1$ II. $f(x) = |x| + 3$ III. $f(x) = |x + 3|$
- A. I only
B. I and II
C. I and III
D. I, II, and III
E. None of the functions are even
4. Find the vertex of the parabola that has x -intercepts at 1 and 5 and passes through the point $(0, 10)$.
- A. $(3, 2)$
B. $(3, -2)$
C. $(3, -8)$
D. $(3, -4)$
E. $(3, 4)$

5. If the point $P(4, 9)$ is on the graph of the function f , find the corresponding point on the graph $y = \frac{1}{3}f\left(\frac{1}{4}x\right) + 2$.
- A. $(1, 5)$
 - B. $(16, 5)$
 - C. $\left(1, \frac{11}{3}\right)$
 - D. $\left(16, \frac{11}{3}\right)$
 - E. $(16, 29)$
6. Find the domain of the function $f(x) = \sqrt{x^2 - 3x - 4}$.
- A. $(-\infty, -1] \cup [4, \infty)$
 - B. $[-1, 4]$
 - C. $(-\infty, -1]$
 - D. $[5, \infty)$
 - E. $(-\infty, \infty)$
7. Given $f(x) = \frac{1}{x-4}$ and $g(x) = \sqrt{3-x}$, find the domain of $(f \circ g)(x)$.
- A. $(-\infty, 3]$
 - B. $(-\infty, -13)$
 - C. $(-\infty, -13) \cup (-13, 3]$
 - D. $(-13, 3]$
 - E. None of the above
8. On a certain route, an airline carries 8000 passengers per month, each paying \$50. A market survey indicates that for each \$1 increase in price, the airline will lose 100 passengers. Find the ticket price that maximizes revenue for the route.
- A. \$50
 - B. \$55
 - C. \$60
 - D. \$65
 - E. \$70

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



- A. $g(x) = -2f(x + 8) + 1$
B. $g(x) = -\frac{1}{2}(x + 8) - 2$
C. $g(x) = 2f(-x - 8) + 1$
D. $g(x) = -\frac{1}{2}f(x - 8) - 2$
E. $g(x) = -\frac{1}{2}f(x + 8) + 1$
10. Find the range of the piecewise defined function $g(x) = \begin{cases} x + 5 & \text{if } x \leq -2 \\ x^2 & \text{if } 0 \leq x < 3 \end{cases}$
- A. $(-\infty, \infty)$
B. $(-\infty, -2] \cup [0, 3)$
C. $(-\infty, 9)$
D. $(-\infty, 0) \cup (0, 9)$
E. None of the above

11. A doorway has a parabolic arch and is 9 feet high at the center and 6 feet wide at the base. If a rectangular box 4 feet wide must fit through the door, what is maximum height that the box can have?
- A. 3 feet
B. 4 feet
C. 5 feet
D. 6 feet
E. 7 feet

12. Several values of two functions f and g are listed in the table below. If possible, find $(g \circ f)(7)$.

x	6	7	8	9	10
$f(x)$	7	9	10	6	8
$g(x)$	8	7	9	10	6

- A. 6
B. 7
C. 8
D. 9
E. 10
13. Given $f(x) = \frac{x-2}{x+1}$ and $g(x) = \frac{1-x}{x+3}$, find $(f \circ g)(x)$.
- A. $\frac{7-3x}{4}$
B. $\frac{-3x-5}{4}$
C. $\frac{-x-1}{x+4}$
D. $\frac{1}{2x+4}$
E. $\frac{-x-3}{x+4}$

14. If a linear function f satisfies the conditions $f(-1) = 3$ and $f(2) = -6$, find $f(x)$.
- A. $y = -3x$
 - B. $y = 3x + 6$
 - C. $y = 3x - 12$
 - D. $y = -2x + 1$
 - E. $y = -2x - 2$
15. A certain paperback sells for \$20. The author is paid royalties of 10% on the first 10,000 copies sold, 15% on the next 5000 copies, and 20% on any additional copies. Find a piecewise function R that specifies the total royalties if x copies are sold.
- A. $R(x) = \begin{cases} 0.1x & 0 \leq x \leq 10000 \\ 0.15x & 10000 < x \leq 15000 \\ 0.2x & x > 15000 \end{cases}$
 - B. $R(x) = \begin{cases} 0.1x & 0 \leq x \leq 10000 \\ 0.15x - 500 & 10000 < x \leq 15000 \\ 0.2x - 1250 & x > 15000 \end{cases}$
 - C. $R(x) = \begin{cases} 2x & 0 \leq x \leq 10000 \\ 3x & 10000 < x \leq 15000 \\ 4x & x > 15000 \end{cases}$
 - D. $R(x) = \begin{cases} 2x & 0 \leq x \leq 10000 \\ 3x - 10000 & 10000 < x \leq 15000 \\ 4x - 25000 & x > 15000 \end{cases}$
 - E. None of the above

Answers:

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