

Classroom Voting Questions: Precalculus

New Functions From Old: Compositions, Inverses, and Transforms

1. The functions f and g have values given in the table below. What is the value of $f(g(0))$?

| | | | | | |
|--------|----|----|----|---|----|
| x | -2 | -1 | 0 | 1 | 2 |
| $f(x)$ | 1 | 0 | -2 | 2 | -1 |
| $g(x)$ | -1 | 1 | 2 | 0 | -2 |

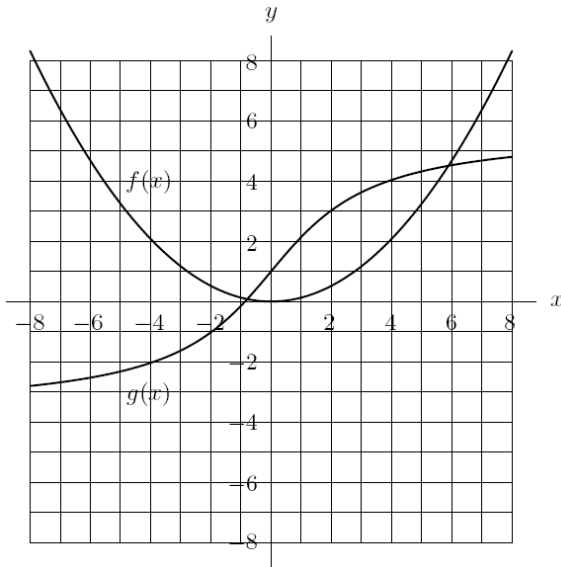
- (a) -2
- (b) -1
- (c) 0
- (d) 1
- (e) 2

2. The functions f and g have values given in the table below. If $f(g(x)) = 1$, then what is x ?

| | | | | | |
|--------|----|----|----|---|----|
| x | -2 | -1 | 0 | 1 | 2 |
| $f(x)$ | 1 | 0 | -2 | 2 | -1 |
| $g(x)$ | -1 | 1 | 2 | 0 | -2 |

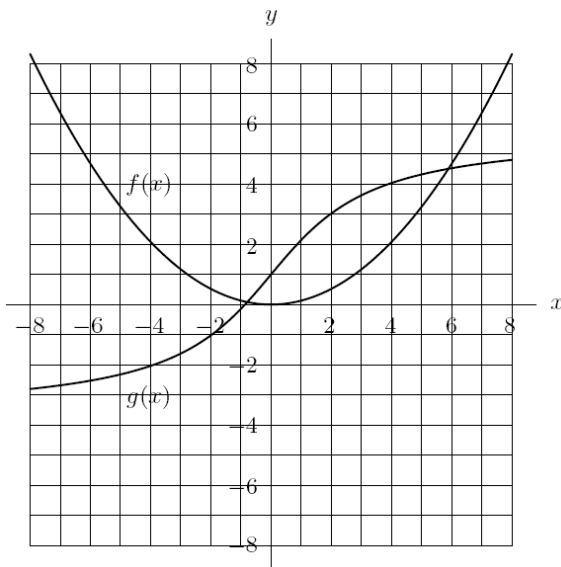
- (a) -2
- (b) -1
- (c) 0
- (d) 1
- (e) 2

3. The graphs of f and g are shown in the figure below. Estimate the value of $g(f(3))$.



- (a) -1
- (b) 0
- (c) 1
- (d) 2
- (e) 3
- (f) 5

4. The graphs of f and g are shown in the figure below. Estimate the value of $f(g(2))$.



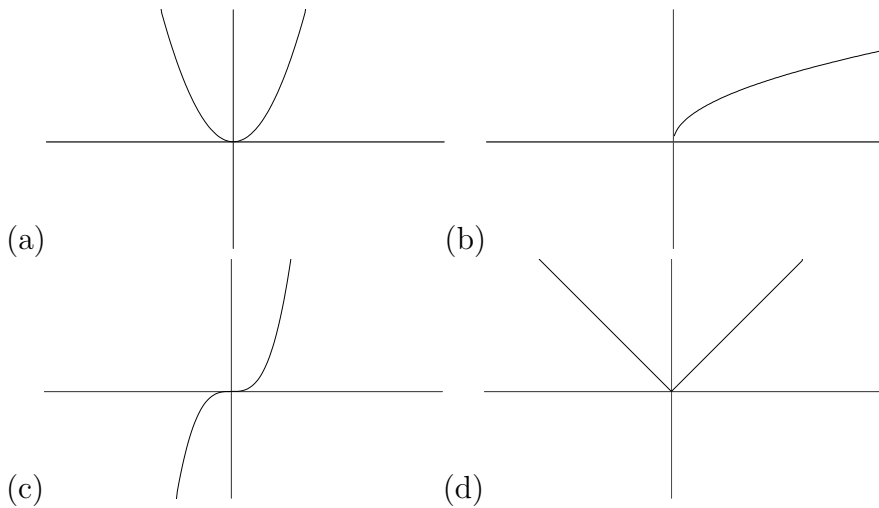
- (a) -1
- (b) 0

- (c) 1
- (d) 2
- (e) 3
- (f) 5

5. If $P = f(t) = 3 + 4t$, find $f^{-1}(P)$.

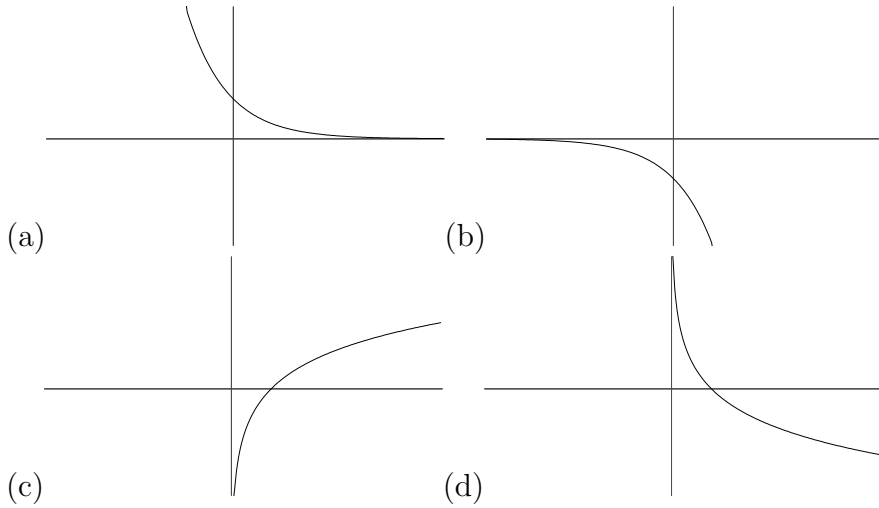
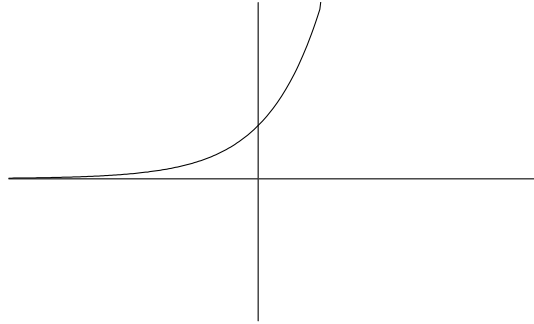
- (a) $f^{-1}(P) = 3 + 4P$
- (b) $f^{-1}(P) = \frac{P-3}{4}$
- (c) $f^{-1}(P) = \frac{P-4}{3}$
- (d) $f^{-1}(P) = 4(P + 3)$
- (e) $f^{-1}(P) = \frac{P+3}{4}$

6. Which of these functions has an inverse?



- (a) (a) only
- (b) (b) only
- (c) (c) only
- (d) (d) only
- (e) (a) and (b)
- (f) (b) and (c)

7. The following is a graph of $f(x)$. Which graph below is the inverse?



8. Given that $f(x) = \sqrt[5]{\frac{x^3 - 72}{800}}$, find $f \circ f^{-1}(437)$.

- (a) 104,316.73
- (b) 1671.2
- (c) 437
- (d) 10.08

9. If $f(x) = \frac{x}{x^2 + 1}$, what is $f^{-1} \circ f(-2)$?

- (a) $-\frac{2}{5}$
- (b) $\frac{2}{3}$
- (c) $-\frac{5}{2}$
- (d) -2

10. If $(4, -2)$ is a point on the graph of $y = f(x)$, which of the following points is on the graph of $y = f^{-1}(x)$?

- (a) $(-2, 4)$
- (b) $(-4, 2)$
- (c) $(\frac{1}{4}, -\frac{1}{2})$
- (d) $(-\frac{1}{4}, \frac{1}{2})$

11. Find the inverse of $f(x) = \frac{1}{x}$.

- (a) $f^{-1}(x) = \frac{x}{1}$
- (b) $f^{-1}(x) = x$
- (c) $f^{-1}(x) = \frac{1}{x}$
- (d) $f^{-1}(x) = xy$

12. A function is given in Figure 1.10 below. Which one of the other graphs could be a graph of $f(x + h)$?

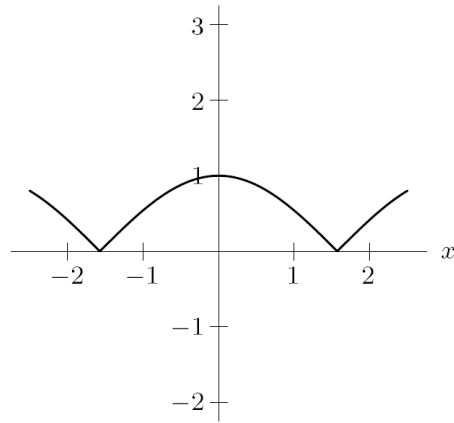
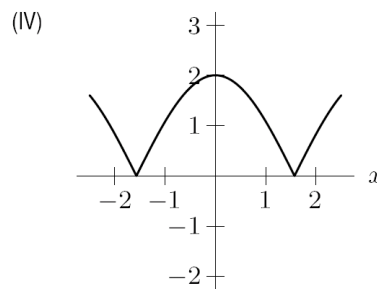
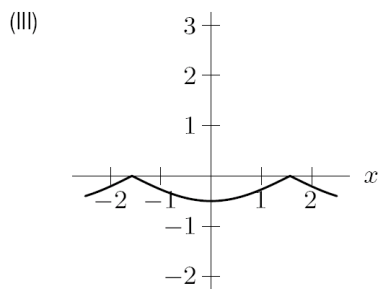
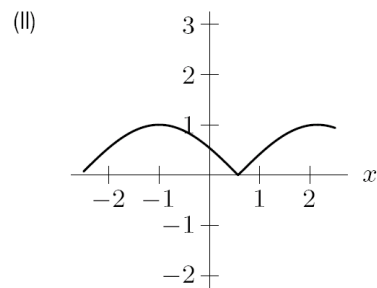
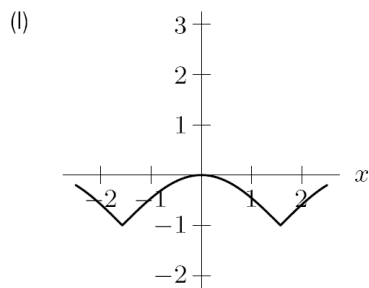


Figure 1.10



- (a) I
- (b) II
- (c) III
- (d) IV

13. How is the graph of $y = 2^{x-1} + 3$ obtained from the graph of $y = 2^x$?

- (a) Move 1 down and 3 right
- (b) Move 1 left and 3 up
- (c) Move 1 up and 3 right
- (d) Move 1 right and 3 up

14. The function $f(x)$ goes through the point A with coordinates $(2,3)$. $g(x) = 2f(\frac{1}{3}x - 2) + 4$. What are the coordinates of point A in the function $g(x)$?
- (a) $(4, 10)$
 - (b) $(4, -\frac{5}{2})$
 - (c) $(12, 10)$
 - (d) $(-\frac{4}{3}, 10)$
 - (e) $(-\frac{4}{3}, -\frac{5}{2})$
15. The point $(4, 1)$ is on the graph of a function f . Find the corresponding point on the graph of $y = f(x - 2)$.
- (a) $(6, 1)$
 - (b) $(2, 1)$
 - (c) $(4, 3)$
 - (d) $(4, -1)$
16. The point $(6, 1)$ is on the graph of a function f . Find the corresponding point on the graph of $y = f(2x)$.
- (a) $(12, 1)$
 - (b) $(3, 1)$
 - (c) $(6, 2)$
 - (d) $(6, \frac{1}{2})$
17. Given the graph of a function $f(x)$, what sequence of activities best describes the process you might go through to graph $g(x) = 5f(-x)$?
- (a) Expand the graph by a factor of 5, then reflect it across the y -axis.
 - (b) Expand the graph by a factor of 5, then reflect it across the x -axis.
 - (c) Reflect the graph across the y -axis, then expand it by a factor of 5.
 - (d) Reflect the graph across the x -axis, then expand it by a factor of 5.
 - (e) More than 1 of the above.
 - (f) None of the above.

18. Given the graph of a function $f(x)$, what sequence of activities best describes the process you might go through to graph $g(x) = -f(x) + 2$?
- Move the graph up 2 units, then reflect it across the x -axis.
 - Move the graph up 2 units, then reflect it across the y -axis.
 - Reflect the graph across the y -axis, then move it up by 2 units.
 - Reflect the graph across the x -axis, then move it up 2 units.
 - More than 1 of the above.
 - None of the above.
19. Take the function $f(x)$ and “Shift the function right h units. Reflect the result across the y -axis, then reflect the result across the x -axis. Finally shift the result up k units.” The end result is:
- $f(x + h) + k$
 - $f(x - h) + k$
 - $-f(-x - h) + k$
 - $-f(-x + h) + k$
20. Given $f(x) = x + 1$ and $g(x) = 3x^2 - 2x$, what is the composition $g(f(x))$.
- $3x^2 - 2x + 1$
 - $(3x^2 - 2x)(x + 1)$
 - $3x^2 + 4x + 1$
 - $3(x + 1)^2 - 2x$
21. Write $h(x) = e^{3x/2}$ as a composition of functions: $f(g(x))$. $f(x) = \underline{\hspace{2cm}}$,
 $g(x) = \underline{\hspace{2cm}}$.
- $e^x, 3x/2$
 - $3x/2, e^x$
 - $x, e^{3x/2}$
 - $x/2, 3e^x$
22. If $f(x) = x^2 + 6$ and $g(x) = x - 3$, what is $f \circ g(x)$?
- $x^2 + 3$

- (b) $x^2 - 6x + 15$
- (c) $x^2 - 3$
- (d) $x^3 - 3x^2 + 6x - 18$

23. Which of the following functions IS invertible?

- (a) $f(x) = -x^4 + 7$
- (b) $g(x) = e^{3x/2}$
- (c) $h(x) = \cos(x)$
- (d) $k(x) = |x|$

24. Let $f(x) = x - 2$ and $g(x) = 3 - x^2$. Find $g(f(2))$.

- (a) -3
- (b) 0
- (c) 3
- (d) 2

25. If $P = f(t) = 3 + 4t$, find $f^{-1}(7)$.

- (a) 31
- (b) $\frac{1}{7}$
- (c) 0
- (d) 1

26. Let $f(x) = x^2$ and $g(x) = x + 2$. True or false? The domain of the function $\frac{f}{g}$ is \mathbb{R} , all real numbers.

- (a) True, and I am very confident.
- (b) True, but I am not very confident.
- (c) False, but I am not very confident.
- (d) False, and I am very confident.

27. Let $f(x) = x^2 - 4$ and $g(x) = \sqrt{x}$. Find $(g \circ f)(x)$ and the domain of $g \circ f$.

- (a) $\sqrt{x^2 - 4}$; Domain: $(-\infty, -2] \cup [2, \infty)$
- (b) $x - 4$; Domain: \mathbb{R}
- (c) $x - 4$; Domain: $[0, \infty)$
- (d) $\sqrt{x^2 - 4}$; Domain: $[0, \infty)$
- (e) $\sqrt{x}(x^2 - 4)$; Domain: $[0, \infty)$