

# 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

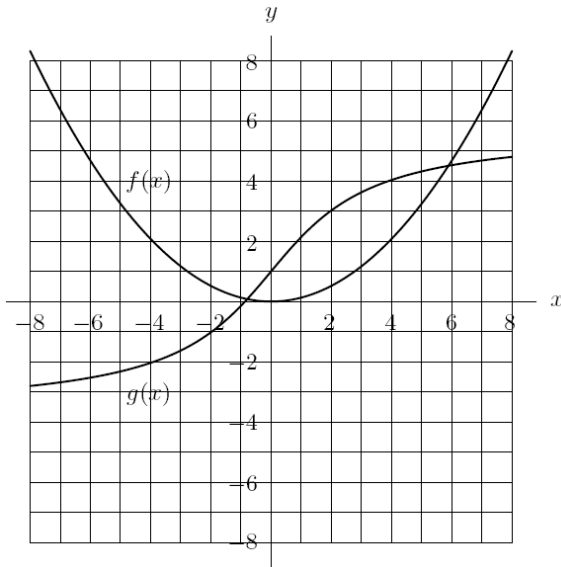
- (a) -2
- (b) -1
- (c) 0
- (d) 1
- (e) 2

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

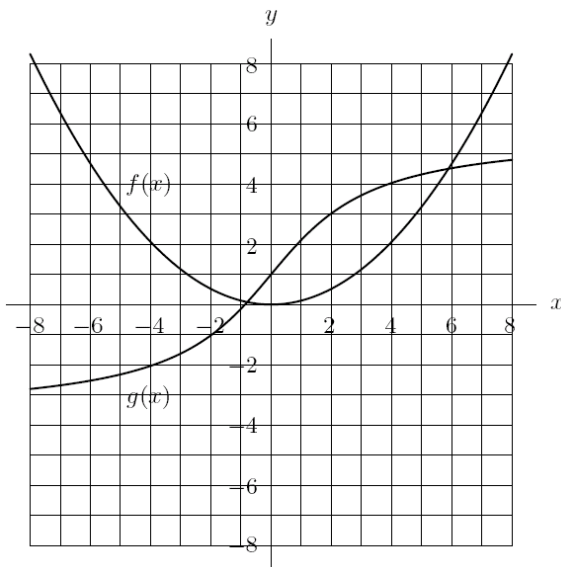
- (a) -2
- (b) -1
- (c) 0
- (d) 1
- (e) 2

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  $f(g(2))$ .



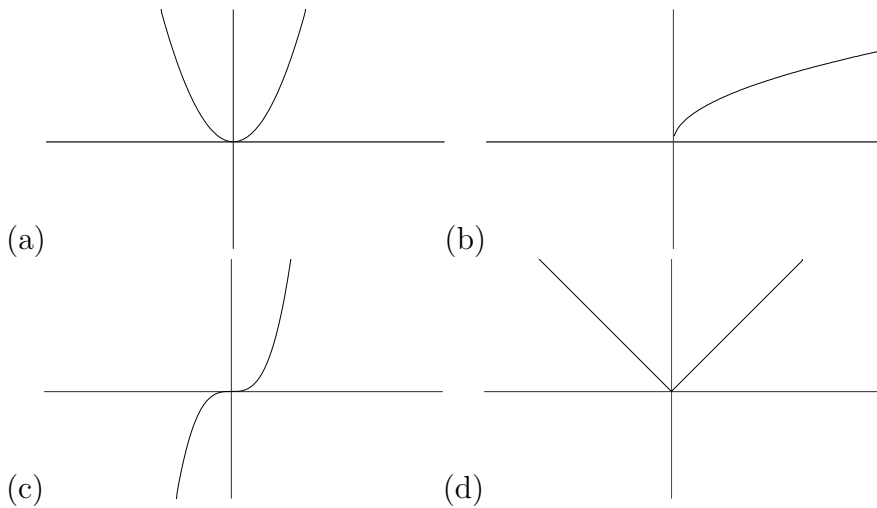
- (a) -1
- (b) 0

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

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

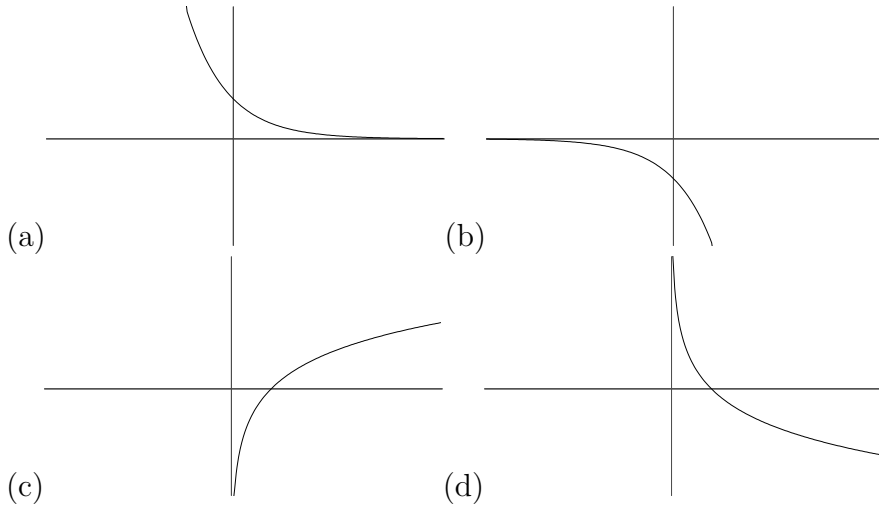
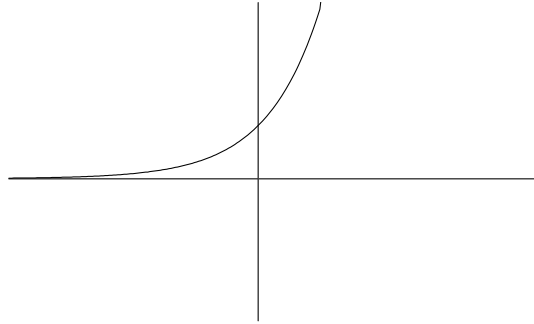
- (a)  $f^{-1}(P) = 3 + 4P$
- (b)  $f^{-1}(P) = \frac{P-3}{4}$
- (c)  $f^{-1}(P) = \frac{P-4}{3}$
- (d)  $f^{-1}(P) = 4(P + 3)$
- (e)  $f^{-1}(P) = \frac{P+3}{4}$

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  $f(x + h)$ ?

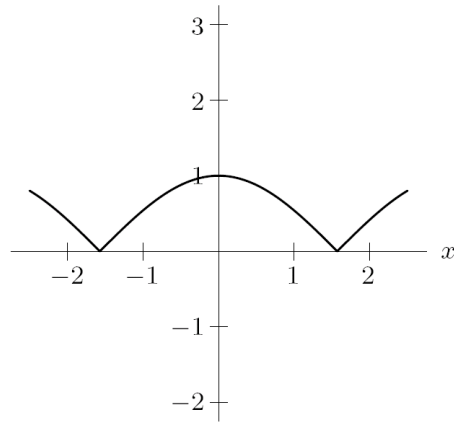
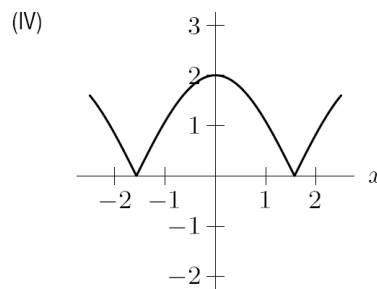
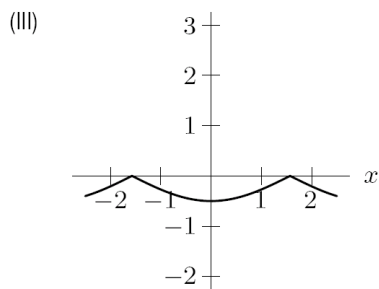
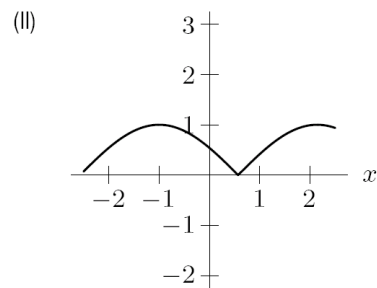
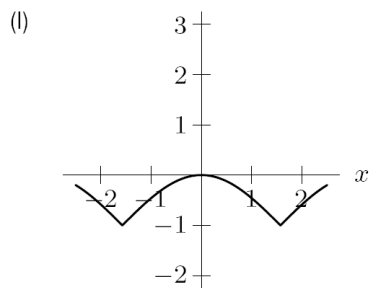


Figure 1.10



- (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:  $[0, \infty)$