

***Preparation for Calculus - Functions and How They
Change 1st edition Crauder Test Bank***

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Chapter 2

1. If $f(x) = 2 - 3x$ and $g(x) = 3x - 5$, what is $(f - g)(x)$?

- a. -3
- b. $7 - 6x$
- c. $6x - 7$
- d. $-3 - 6x$

ANSWER: b

2. $\frac{-1}{2x+1}$ If $f(x) = \frac{2}{x}$ and $g(x) = -\frac{3}{x+1}$, what is $(g + f)(x)$?

- a. $\frac{5x+2}{x^2+x}$
- b. $\frac{-1}{2x+1}$
- c. $\frac{2x-2}{x^2+x}$
- d. $\frac{2-x}{x^2+x}$

ANSWER: d

3. If $f(x) = \frac{3x+2}{x-4}$ and $g(x) = \frac{2-3x}{4-x}$, what is $\left(\frac{f}{g}\right)(x)$?

- a. -1
- b. $\frac{2-3x}{3x+2}$, assuming that $x \neq 4$
- c. $\frac{3x+2}{3x-2}$, assuming that $x \neq 4$
- d. $\frac{3x-2}{3x+2}$, assuming that $x \neq 4$

ANSWER: c

4. If $f(x) = \sqrt{x+3}$ and $g(x) = 2x^2$, what is $(g \circ f)(x)$?

- a. $2x + 6$, assuming that $x \geq -3$
- b. $2x + 3$, assuming that $x \geq -3$
- c. $\sqrt{2x^2+3}$, assuming that $x \geq -3$
- d. $2x^2\sqrt{x+3}$, assuming that $x \geq -3$

ANSWER: a

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5. If $f(x) = \frac{3x}{x+3}$, what is $-2 \cdot f(-1)$?

- a. -3
- b. $-\frac{3}{2}$
- c. 3
- d. 6

ANSWER: c

6. If $f(x) = 4 - 3x$, what is $(f \circ f)(2)$?

- a. -2
- b. 2
- c. 4
- d. 10

ANSWER: d

7. If $f(x) = \sqrt{x^2 - x}$ and $g(x) = \sqrt{x}$, what is $(f \circ g)(4)$?

- a. $\sqrt{2}$
- b. 2
- c. 4
- d. $\sqrt{6}$

ANSWER: a

8. If $f(x) = \frac{x}{x^2 + 5x - 6}$ and $g(x) = \frac{1}{\sqrt{x}}$, what is the domain of $(f \cdot g)(x)$?

- a. $(-\infty, -6) \cup (-6, 1) \cup (1, \infty)$
- b. $(1, \infty)$
- c. $(0, 1) \cup (1, \infty)$
- d. $(0, \infty)$

ANSWER: c

9. Find functions $f(x)$ and $g(x)$ such that $h(x) = \frac{x^2 - 5}{(4 - x^2)^2}$ is equivalent to $(g \circ f)(x)$.

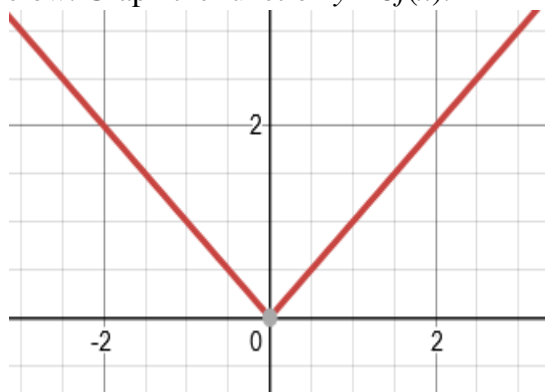
ANSWER: $f(x) = x^2$, $g(x) = \frac{x - 5}{(4 - x)^2}$

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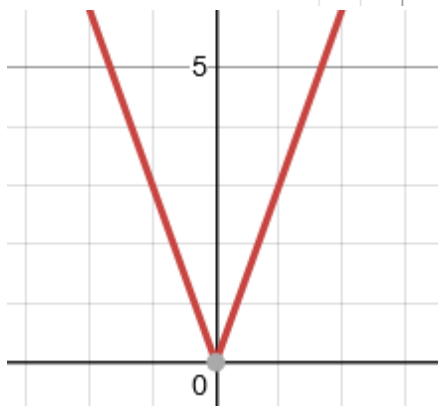
10. Find functions $f(x)$ and $g(x)$ such that $f(x) = \sqrt{2 - 5x^3}$ is equivalent to $(f \circ g)(x)$.

ANSWER: Various answers possible. One is $f(x) = \sqrt{x}$, $g(x) = 2 - 5x^3$.

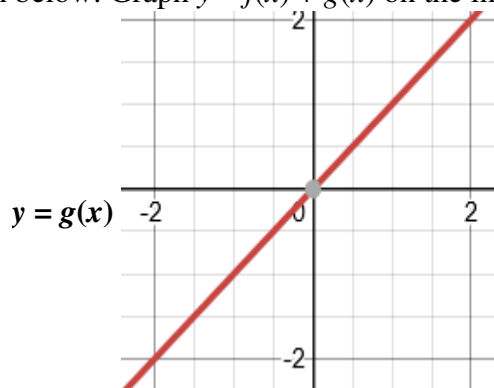
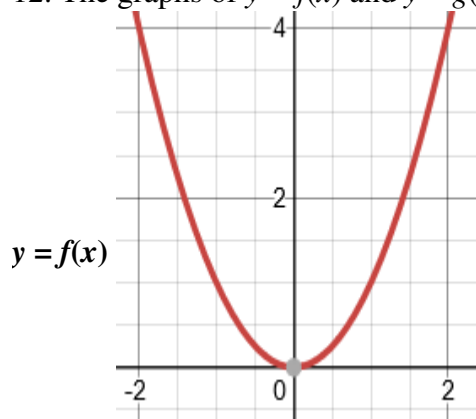
11. The graph of $y = f(x)$ is given below. Graph the function $y = 3f(x)$.



ANSWER:

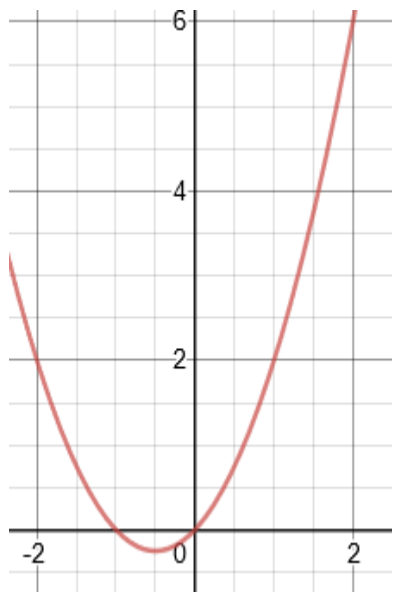


12. The graphs of $y = f(x)$ and $y = g(x)$ are given below. Graph $y = f(x) + g(x)$ on the interval $[-2, 2]$.



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ANSWER:



13. If $f(x) = 4x + 1$ and $g(x) = \sqrt{x}$, what is the domain of $(g \circ f)(x)$?

- a. All real numbers
- b. $(0, \infty)$
- c. $\left[-\frac{1}{4}, \infty\right)$
- d. $[0, \infty)$

ANSWER: c

14. Suppose the domain of $f(x)$ is the set of all real numbers except -1 and that the domain of $g(x)$ is the set of all real numbers except 2. In addition, assume $f(5) = 0$. Based on this information, what is the domain of $\left(\frac{g}{f}\right)(x)$?

- a. all real numbers except -1
- b. all real numbers except 2
- c. all real numbers except -1 and 2
- d. all real numbers except -1 , 2, and 5

ANSWER: d

15. If $f(x) = \frac{1}{x}$ and $g(x) = \frac{2x}{3x + 2}$, what is $(g \circ f)(x)$?

- a. $\frac{3 + 2x}{2}$, $x \neq 0$

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b. $\frac{2}{3+2x}$, $x \neq 0$

c. $\frac{2}{3x+2}$, $x \neq 0$

d. $\frac{3x+2}{2x}$, $x \neq 0$

ANSWER: b

16. If $g(x) = 3^x$ and $f(x) = -2x$, what is $(g \circ f)(x)$?

a. -6^x

b. $-2 \cdot 3^x$

c. 9^{-x}

d. 6^{-x}

ANSWER: c

17. If $f(x) = 1 - |x|$, what is $(f \circ f \circ f)(-3)$?

ANSWER: 0

18. If $f(x) = x^2 - x$ and $g(x) = 1 - 2x - x^2$, what is $(2f - 4g)(x)$?

a. $x^2 - 3x - 4$

b. $2x^2 - 2x$

c. $6x^2 + 6x - 4$

d. $4x^2 + 8x - 4$

ANSWER: c

19. True or False? Every linear function has an inverse.

a. True

b. False

ANSWER: b

20. If g is the inverse function of f and $f(-1) = 2$, then $g(2) =$ _____.

ANSWER: -1

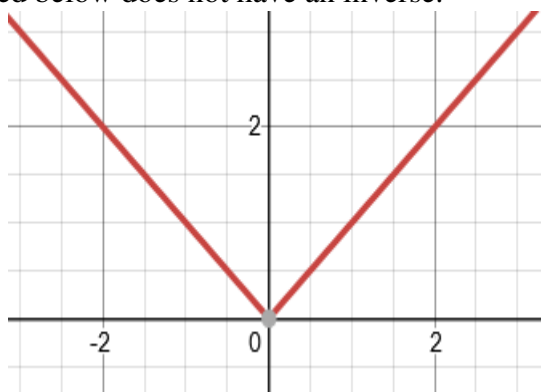
21. Suppose $f(x)$ has domain $[1, 4]$ and range $[0, 3]$. If $f(x)$ has an inverse $f^{-1}(x)$, which of the following are the domain and range of $f^{-1}(x)$?

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- The domain of $f^{-1}(x)$ is $[1, 4]$ and the range of $f^{-1}(x)$ is $[0, 3]$.
- The domain of $f^{-1}(x)$ is $[0, 3]$ and the range of $f^{-1}(x)$ is $[0, 3]$.
- The domain of $f^{-1}(x)$ is $[0, 3]$ and the range of $f^{-1}(x)$ is $[1, 4]$.
- The domain of $f^{-1}(x)$ is $[1, 4]$ and the range of $f^{-1}(x)$ is $[1, 4]$.

ANSWER: c

22. True or False? The function graphed below does not have an inverse.



- True
- False

ANSWER: a

23. If $f(x) = 5x - 2$, find the inverse function $f^{-1}(x)$.

- $f^{-1}(x) = \frac{1}{5x - 2}$
- $f^{-1}(x) = \frac{1}{5}x - \frac{1}{2}$
- $f^{-1}(x) = \frac{x - 5}{2}$
- $f^{-1}(x) = \frac{x + 2}{5}$

ANSWER: d

24. If $f(x) = \frac{x}{x + 4}$, find the inverse function $f^{-1}(x)$.

- $f^{-1}(x) = \frac{4x}{x - 1}$
- $f^{-1}(x) = \frac{4x}{1 - x}$

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c. $f^{-1}(x) = \frac{x-1}{4x}$

d. $f^{-1}(x) = \frac{x+4}{x}$

ANSWER: b

25. If $f(x) = x^7 + 3$, find the inverse function $f^{-1}(x)$.

a. $f^{-1}(x) = \sqrt[7]{x} - 3$

b. $f^{-1}(x) = \sqrt[7]{x+3}$

c. $f^{-1}(x) = \sqrt[7]{x-3}$

d. $f^{-1}(x) = \frac{1}{x^7+3}$

ANSWER: c

26. If $f(x) = (2x+3)^5$, find the inverse function $f^{-1}(x)$.

a. $f^{-1}(x) = \frac{\sqrt[5]{x} - 3}{2}$

b. $f^{-1}(x) = \frac{\sqrt[5]{x-3}}{2}$

c. $f^{-1}(x) = 2\sqrt[5]{x-3}$

d. $f^{-1}(x) = 2\sqrt[5]{x} - 3$

ANSWER: a

27. If $f(x) = \frac{x-5}{3-x}$, find the inverse function $f^{-1}(x)$.

a. $f^{-1}(x) = \frac{3-x}{x-5}$

b. $f^{-1}(x) = \frac{5x-1}{x+3}$

c. $f^{-1}(x) = \frac{3x+1}{x-5}$

d. $f^{-1}(x) = \frac{3x+5}{x+1}$

ANSWER: d

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28. Suppose the function $E(x)$ tells you the amount you earn, in dollars, for having worked x hours. What does $E^{-1}(120)$ tell you?

ANSWER: The number of hours you would need to work to earn 120 dollars

29. If the graph of $y = f(x)$ has two x -intercepts $(6, 0)$ and $(10, 0)$, which of the following statements must be true?

- The function $f(x)$ does not have an inverse.
- The points $(0, 6)$ and $(0, 10)$ are on the graph of the inverse function $f^{-1}(x)$.
- Both 6 and 10 belong to the domain of the inverse function $f^{-1}(x)$.
- Both 6 and 10 belong to the range of the inverse function $f^{-1}(x)$.

ANSWER: a

30. The function $V(r) = \frac{4}{3} \pi r^3$, for $r > 0$, gives the volume of a sphere of radius r . What does the inverse function $V^{-1}(r)$ tell you?

ANSWER: The radius r that is needed for a sphere to have a desired volume

31. Determine the inverse function for $f(x) = 3 - 2 \cdot \sqrt[5]{4x - 7}$.

ANSWER: Solve the equation $y = 3 - 2 \cdot \sqrt[5]{4x - 7}$ for x :

$$y = 3 - 2 \cdot \sqrt[5]{4x - 7}$$

$$y - 3 = -2 \cdot \sqrt[5]{4x - 7}$$

$$\frac{y - 3}{-2} = \sqrt[5]{4x - 7}$$

$$\left(\frac{y - 3}{-2} \right)^5 = 4x - 7$$

$$7 + \left(\frac{y - 3}{-2} \right)^5 = 4x$$

$$\frac{1}{4} \left(7 + \left(\frac{y - 3}{-2} \right)^5 \right) = x$$

$$\text{So, } f^{-1}(x) = \frac{1}{4} \left(7 + \left(\frac{y - 3}{-2} \right)^5 \right)$$

32. Determine the inverse function for $f(x) = 4 + (2x + 1)^7$.

ANSWER: Solve the equation $y = 4 + (2x + 1)^7$ for x :

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$$y = 4 + (2x + 1)^7$$

$$y - 4 = (2x + 1)^7$$

$$\sqrt[7]{y-4} = 2x + 1$$

$$-1 + \sqrt[7]{y-4} = 2x$$

$$\frac{1}{2}(-1 + \sqrt[7]{y-4}) = x$$

$$\text{So, } f^{-1}(x) = \frac{1}{2}(-1 + \sqrt[7]{x-4}).$$

33. How do you obtain the graph of $y = f(x) + 3$ from the graph of $y = f(x)$?

- a. shift the graph of $y = f(x)$ up 3 units
- b. shift the graph of $y = f(x)$ down 3 units
- c. shift the graph of $y = f(x)$ left 3 units
- d. shift the graph of $y = f(x)$ right 3 units

ANSWER: a

34. How do you obtain the graph of $y = f(x + 2)$ from the graph of $y = f(x)$?

- a. shift the graph of $y = f(x)$ up 2 units
- b. shift the graph of $y = f(x)$ down 2 units
- c. shift the graph of $y = f(x)$ left 2 units
- d. shift the graph of $y = f(x)$ right 2 units

ANSWER: c

35. How do you obtain the graph of $y = f(x - 4)$ from the graph of $y = f(x)$?

- a. shift the graph of $y = f(x)$ up 4 units
- b. shift the graph of $y = f(x)$ down 4 units
- c. shift the graph of $y = f(x)$ left 4 units
- d. shift the graph of $y = f(x)$ right 4 units

ANSWER: d

36. How do you obtain the graph of $y = f(x) - 5$ from the graph of $y = f(x)$?

- a. shift the graph of $y = f(x)$ up 5 units
- b. shift the graph of $y = f(x)$ down 5 units
- c. shift the graph of $y = f(x)$ left 5 units

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d. shift the graph of $y = f(x)$ right 5 units

ANSWER: b

37. How do you obtain the graph of $y = f(-x)$ from the graph of $y = f(x)$?

- a. reflect the graph of $y = f(x)$ over the x -axis
- b. reflect the graph of $y = f(x)$ over the y -axis
- c. shift the graph of $y = f(x)$ left 1 unit
- d. shift the graph of $y = f(x)$ right 1 unit

ANSWER: b

38. How do you obtain the graph of $y = f(x+4) - 2$ from the graph of $y = f(x)$?

- a. shift the graph of $y = f(x)$ down 4 units and right 2 units
- b. shift the graph of $y = f(x)$ up 4 units and left 2 units
- c. shift the graph of $y = f(x)$ left 4 units and up 2 units
- d. shift the graph of $y = f(x)$ left 4 units and down 2 units

ANSWER: d

39. How do you obtain the graph of $y = f(x-3) + 4$ from the graph of $y = f(x)$?

- a. shift the graph of $y = f(x)$ right 3 units and up 4 units
- b. shift the graph of $y = f(x)$ left 3 units and up 4 units
- c. shift the graph of $y = f(x)$ right 4 units and down 3 units
- d. shift the graph of $y = f(x)$ left 4 units and down 3 units

ANSWER: a

40. How do you obtain the graph of $y = 5 - f(x+1)$ from the graph of $y = f(x)$?

- a. shift the graph of $y = f(x)$ right 1 unit, reflect that over the y -axis, and then shift that up 5 units
- b. shift the graph of $y = f(x)$ left 1 unit, reflect that over the y -axis, and then shift that up 5 units
- c. shift the graph of $y = f(x)$ left 1 unit, reflect that over the x -axis, and then shift that up 5 units
- d. shift the graph of $y = f(x)$ right 1 unit, reflect that over the x -axis, and then shift that up 5 units

ANSWER: c

41. Which of these functions is even?

- a. $f(x) = (x+4)^2$
- b. $g(x) = \sqrt{x}$

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c. $j(x) = \frac{1}{x^2} + 2$

d. $k(x) = x^3$

ANSWER: c

42. Which of these functions is odd?

a. $f(x) = x^3 + x$

b. $g(x) = (x + 1)^3$

c. $h(x) = x^3 - 1$

d. $j(x) = x^2(x^2 + 1)$

ANSWER: a

43. Classify the function $f(x) = x \cdot |x|$.

a. even

b. odd

c. both even and odd

d. neither even nor odd

ANSWER: b

44. Classify the function $f(x) = x^2(x^2 + 1)$.

a. even

b. odd

c. both even and odd

d. neither even nor odd

ANSWER: a

45. Classify the function $f(x) = x^3 - x^2 + x$.

a. even

b. odd

c. both even and odd

d. neither even nor odd

ANSWER: d

46. Classify the function $f(x) = \sqrt[3]{1 - x^4}$.

a. even

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- b. odd
- c. both even and odd
- d. neither even nor odd

ANSWER: a

47. Classify the function $f(x) = \frac{x}{x^3 + 1}$.

- a. even
- b. odd
- c. both even and odd
- d. neither even nor odd

ANSWER: d

48. If the point $(-1, 3)$ is on the graph of $y = f(x)$, what point must be on the graph of $y = f(x) - 2$?

- a. $(-3, 3)$
- b. $(-1, 1)$
- c. $(-1, 5)$
- d. $(1, 3)$

ANSWER: b

49. If the point $(5, -4)$ is on the graph of $y = f(x)$, what point must be on the graph of $y = 4 - \frac{1}{2}f(x)$?

- a. $(-4, 6)$
- b. $\left(5, \frac{3}{2}\right)$
- c. $(5, 0)$
- d. $(5, 6)$

ANSWER: d

50. Assume the points $(2, 4)$ and $(-2, 6)$ are on the graph of $y = f(x)$. If $g(x) = 2 - f(-x)$, compute $g(2)$.

ANSWER: -4