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

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Name:_____ Class:_____ Date:_____

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

a. -3

b. $-\dfrac{3}{2}$

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 $f(x) = \dfrac{x}{x^2 + 5x - 6}$ and $g(x) = \dfrac{1}{\sqrt{x}}$, 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 $h(x) = \dfrac{x^2 - 5}{(4 - x^2)^2}$ is equivalent to $(g \circ f)(x)$.

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

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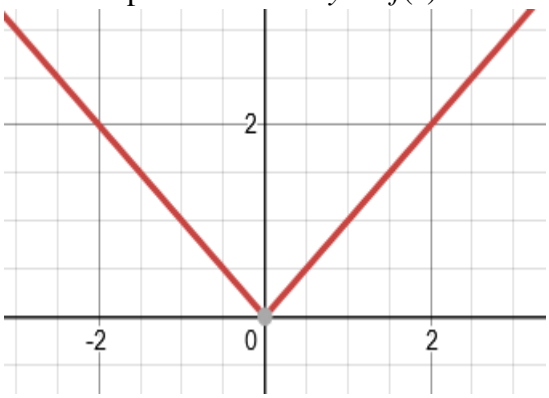
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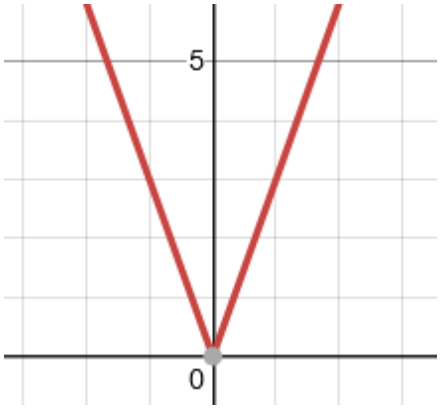
10. Find functions $f(x)$ and $g(x)$ such that $f(x)=\sqrt{2-5x^3}$ is equivalent to $(f\circ g)(x)$.

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 $y=3f(x)$.

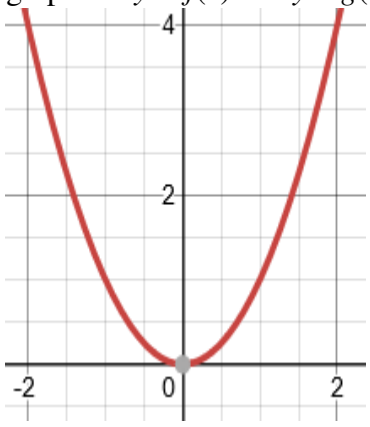


ANSWER:

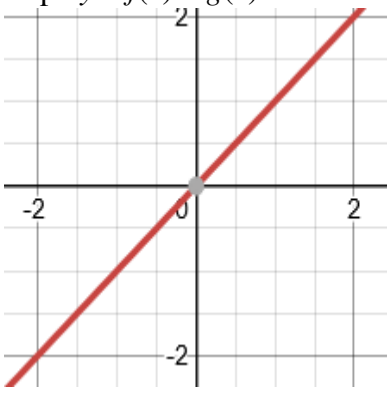


12. The graphs of $y=f(x)$ and $y=g(x)$ are given below. Graph $y=f(x)+g(x)$ on the interval $[-2, 2]$.

$y=f(x)$



$y=g(x)$

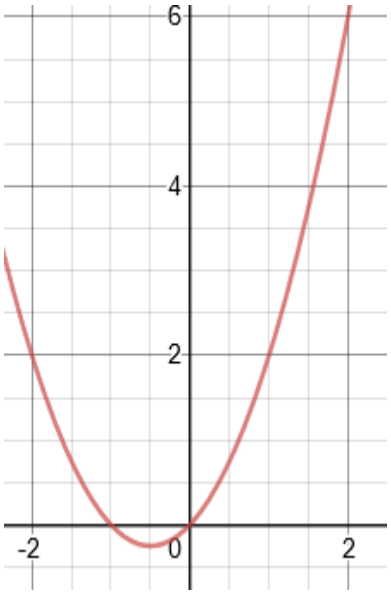


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ANSWER:



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. Fale

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

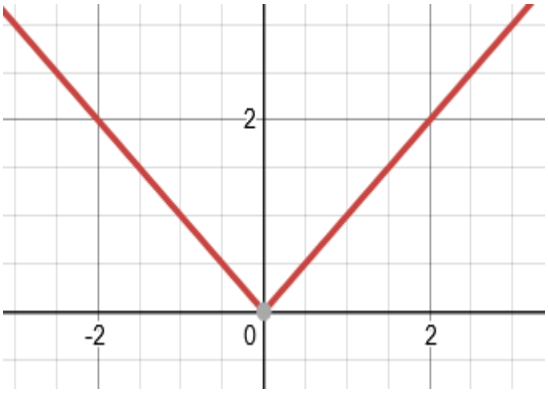
b. The domain of $f^{-1}(x)$ is [0, 3] and the range of $f^{-1}(x)$ is [0, 3].

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

d. 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.



a. True

b. False

ANSWER: a

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

a. $f^{-1}(x) = \dfrac{1}{5x - 2}$

b. $f^{-1}(x) = \dfrac{1}{5}x - \dfrac{1}{2}$

c. $f^{-1}(x) = \dfrac{x - 5}{2}$

d. $f^{-1}(x) = \dfrac{x + 2}{5}$

ANSWER: d

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

a. $f^{-1}(x) = \dfrac{4x}{x - 1}$

b. $f^{-1}(x) = \dfrac{4x}{1 - x}$

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

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

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

ANSWER: c

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

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

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

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

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

ANSWER: a

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

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

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

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

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

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?

a. The function $f(x)$ does not have an inverse.

b. The points (0, 6) and (0, 10) are on the graph of the inverse function $f^{-1}(x)$.

c. Both 6 and 10 belong to the domain of the inverse function $f^{-1}(x)$.

d. 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 $f(x) = 3 - 2\sqrt[5]{4x-7}$.

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

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

So, $f^{-1}(x) = \frac{1}{4}(7-)$.

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

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

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. $j(x)=x^2\left(x^2+1\right)$

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 $f(x)=x^2\left(x^2+1\right)$.

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

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