5.1 Assess Your Understanding

'Are You Prepared?' *Answers are given at the end of these exercises. If you get a wrong answer, read the pages listed in red.*

1. Find $f(3)$ if $f(x) = -4x^2 + 5x$. (pp. 49–52)
2. Find $f(3x)$ if $f(x) = 4 - 2x^2$. (pp. 49–52)
3. Find the domain of the function $f(x) = \dfrac{x^2 - 1}{x^2 - 25}$. (pp. 52–54)

Concepts and Vocabulary

4. Given two functions f and g, the _____ _____, denoted $f \circ g$, is defined by $f \circ g(x) =$ _____.
5. ***True or False*** $f(g(x)) = f(x) \cdot g(x)$.
6. ***True or False*** The domain of the composite function $(f \circ g)(x)$ is the same as the domain of $g(x)$.

Skill Building

In Problems 7 and 8, evaluate each expression using the values given in the table.

7.

x	−3	−2	−1	0	1	2	3
f(x)	−7	−5	−3	−1	3	5	7
g(x)	8	3	0	−1	0	3	8

(a) $(f \circ g)(1)$ (b) $(f \circ g)(-1)$
(c) $(g \circ f)(-1)$ (d) $(g \circ f)(0)$
(e) $(g \circ g)(-2)$ (f) $(f \circ f)(-1)$

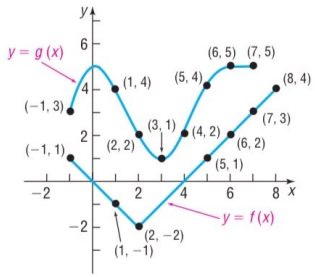
8.

x	−3	−2	−1	0	1	2	3
f(x)	11	9	7	5	3	1	−1
g(x)	−8	−3	0	1	0	−3	−8

(a) $(f \circ g)(1)$ (b) $(f \circ g)(2)$
(c) $(g \circ f)(2)$ (d) $(g \circ f)(3)$
(e) $(g \circ g)(1)$ (f) $(f \circ f)(3)$

In Problems 9 and 10, evaluate each expression using the graphs of $y = f(x)$ and $y = g(x)$ shown in the figure.

9. (a) $(g \circ f)(-1)$ (b) $(g \circ f)(0)$
   (c) $(f \circ g)(-1)$ (d) $(f \circ g)(4)$
10. (a) $(g \circ f)(1)$ (b) $(g \circ f)(5)$
    (c) $(f \circ g)(0)$ (d) $(f \circ g)(2)$



In Problems 11–20, for the given functions f and g, find:

(a) $(f \circ g)(4)$ (b) $(g \circ f)(2)$ (c) $(f \circ f)(1)$ (d) $(g \circ g)(0)$

11. $f(x) = 2x$; $g(x) = 3x^2 + 1$
12. $f(x) = 3x + 2$; $g(x) = 2x^2 - 1$
13. $f(x) = 4x^2 - 3$; $g(x) = 3 - \dfrac{1}{2}x^2$
14. $f(x) = 2x^2$; $g(x) = 1 - 3x^2$
15. $f(x) = \sqrt{x}$; $g(x) = 2x$
16. $f(x) = \sqrt{x + 1}$; $g(x) = 3x$
17. $f(x) = |x|$; $g(x) = \dfrac{1}{x^2 + 1}$
18. $f(x) = |x - 2|$; $g(x) = \dfrac{3}{x^2 + 2}$
19. $f(x) = \dfrac{3}{x + 1}$; $g(x) = \sqrt[3]{x}$
20. $f(x) = x^{3/2}$; $g(x) = \dfrac{2}{x + 1}$

In Problems 21–28, find the domain of the composite function $f \circ g$.

21. $f(x) = \dfrac{3}{x - 1}$; $g(x) = \dfrac{2}{x}$
22. $f(x) = \dfrac{1}{x + 3}$; $g(x) = -\dfrac{2}{x}$