

HW 1.2.4: Composite Functions

Given each pair of functions, calculate $f(g(0))$ and $g(f(0))$.

1. $f(x) = 3x + 6$, $g(x) = 2 - x^2$

2. $f(x) = 2x + 9$, $g(x) = 3 + 4x^2$

3. $f(x) = \sqrt{x+9}$, $g(x) = 7 - x^3$

4. $f(x) = \frac{1}{x-3}$, $g(x) = 6x - 3$

Use the table of values to evaluate each expression

5. $f(g(7))$

6. $f(g(4))$

7. $g(f(4))$

8. $g(f(2))$

9. $f(f(3))$

10. $f(f(0))$

11. $g(g(1))$

12. $g(g(5))$

x	$f(x)$	$g(x)$
0	6	1
1	1	4
2	5	8
3	9	3
4	3	0
5	4	6
6	8	7
7	2	2
8	0	9
9	1	5

Use the graphs to evaluate the expressions below.

13. $f(g(2))$

14. $f(g(0))$

15. $g(f(0))$

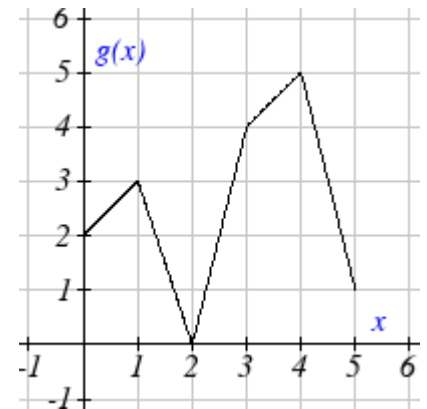
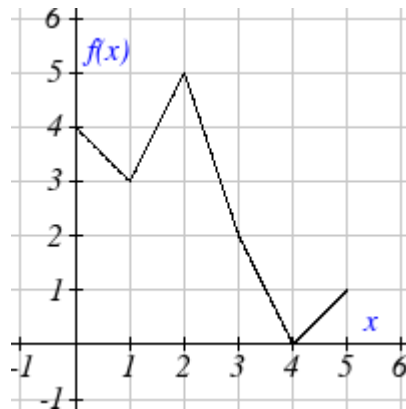
16. $g(f(5))$

17. $f(f(4))$

18. $f(f(3))$

19. $g(g(1))$

20. $g(g(5))$





For each pair of functions, find $f(g(x))$ and $g(f(x))$. Simplify your answers.

21. $f(x) = \frac{1}{x+5}$, $g(x) = \frac{2}{x} - 5$

22. $f(x) = \frac{1}{2x+6}$, $g(x) = \frac{4}{x} - 3$

23. $f(x) = 2x^2 - 1$, $g(x) = \sqrt{x+4}$

24. $f(x) = \sqrt{x} - 3$, $g(x) = 3x^2 - 4$

25. $f(x) = |x|$, $g(x) = 2x - 3$

26. $f(x) = \sqrt[3]{x}$, $g(x) = \frac{x+5}{x^3}$

27. If $f(x) = x^4 - 5$, $g(x) = x + 5$ and $h(x) = 2\sqrt{x}$, find $f(g(h(x)))$

28. If $f(x) = 2x^2 + 3$, $g(x) = \frac{1}{x}$ and $h(x) = 5 - x$, find $f(g(h(x)))$



29. Given functions $p(x) = \frac{1}{\sqrt{x}}$ and $m(x) = x^2 - 1$, state the domains of the following functions using interval notation.
- Domain of $\frac{p(x)}{m(x)}$
 - Domain of $p(m(x))$
 - Domain of $m(p(x))$
30. Given functions $q(x) = \frac{1}{\sqrt{x}}$ and $h(x) = x^2 - 25$, state the domains of the following functions using interval notation.
- Domain of $\frac{q(x)}{h(x)}$
 - Domain of $q(h(x))$
 - Domain of $h(q(x))$
31. The function $D(p)$ gives the number of items that will be demanded when the price is p . The production cost, $C(x)$ is the cost of producing x items. To determine the cost of production when the price is \$10, you would do which of the following:
- Evaluate $D(C(10))$
 - Evaluate $C(D(10))$
 - Solve $D(C(x)) = 10$
 - Solve $C(D(p)) = 10$
32. The function $S(h)$ gives the sleep level on a scale of 0-10 experienced by a person with h hours of sleep without exercise. The amount of sleep of the person after t minutes of exercise is modeled by $e(t)$. To determine when the patient will be at a sleep level of 8, you would need to:
- Evaluate $S(e(8))$
 - Evaluate $e(S(8))$
 - Solve $S(e(t)) = 8$
 - Solve $e(S(h)) = 8$

33. The radius r , in inches, of a basketball is related to the volume, V , by $r(V) = \sqrt[3]{\frac{3V}{4\pi}}$. Air is pumped into the basketball, so the volume after t seconds is given by $V(t) = 12 + 18t$.

- Find the composite function $r(V(t))$
- Find the time when the radius reaches 9 inches.

34. The number of bacteria in a refrigerated food product is given by $N(T) = 24T^2 - 91T + 165$, $3 < T < 33$, where T is the temperature of the food. When the food is removed from the refrigerator, the temperature is given by $T(t) = 3t + 1.6$, where t is the time in hours.

- Find the composite function $N(T(t))$
- Find the time when the bacteria count reaches 9607

Find functions $f(x)$ and $g(x)$ so the given function can be expressed as $h(x) = f(g(x))$.

35. $h(x) = (x - 3)^2$

36. $h(x) = (x + 8)^3$

37. $h(x) = \frac{9}{x + 4}$

38. $h(x) = \frac{1}{(x - 1)^2}$

39. $h(x) = 8 - \sqrt{x + 6}$

40. $h(x) = 5 + \sqrt[3]{x}$