5-5 Additional Practice

Function Operations

Let $f(x) = 3x^2 - 9x - 11$ and $g(x) = 7 - 4x$. Identify rules for the following functions.

1. $f + g$
   $f(x) + g(x) = 3x^2 - 13x - 4$

2. $f - g$
   $f(x) - g(x) = 3x^2 - 5x - 18$

3. Suppose demand d for a company's product at cost x is predicted by the function $d(x) = 0.36x^2 + 810$, and that the price p that the company can charge for the product is given by $p(x) = x + 14$. Find the company's revenue function.
   $f(x) = 0.36x^2 - x + 796$

4. Identify the rule and domain for $\frac{f}{g}$ when $f(x) = x^2 - 5x - 36$ and $g(x) = x - 9$.
   $\left(\frac{f}{g}\right)(x) = x + 4$; all real numbers excluding 9

Let $f(x) = 3x - 2$ and $g(x) = 5x$. Identify the rule for the following functions.

5. $f(g(3))$ 43

6. $f(g(x))$ $15x - 2$

7. Identify the rules for $f \circ g$ and $g \circ f$ when $f(x) = 2x^3$ and $g(x) = x - 1$.
   $(f \circ g)(x) = 2(x - 1)^3$; $(g \circ f)(x) = 2x^3 - 1$

8. As a member of the Game Shop rewards program, you get a 12% discount on purchases. All sales are subject to an 8% sales tax. Write functions to model the discount and the sales tax, then identify the rule for the composition function that calculates the final price you pay Games Shop.
   $D(x) = x - 0.12x$; $T(x) = 0.08(x - 0.12x)$; $P = 0.9504x$

9. Describe and correct the error a student made in finding the rule for the composition $f \circ g$ when $f(x) = 2x^2 - 3x + 1$ and $g(x) = 2x - 1$.

$(f \circ g)(x) = f(g(x))$

The student did not replace the x is $-3x$ with $(2x - 1)$.

$= 2(2x - 1)^2 - 3x + 1$ $= 2(2x - 1)^2 - 3(2x - 1) + 1$

$= 2(4x^2 - 4x + 1) - 3x + 1$ $= 2(4x^2 - 4x + 1) - 6x + 3 + 1$

$= 8x^2 - 11x + 3$ $= 8x^2 - 14x + 6$

The cost in dollars to produce x shovels in a factory is given by the function $C(x) = 23x + 480$. The number of shovels that can be produced in h hours is given by the function $N(h) = 30h$.

10. Find the rule for $C(N(h))$.
    $690h + 480$

11. Find the cost when $h = 8$ hours.
    $6,000

Let $f(x) = 3x^2 + 2x - 3$ and $g(x) = 2x + 4$. Identify the rules for the following functions.

12. $f + g$ $3x^2 + 4x + 1$

13. $f - g$ $3x^2 - 7$