5.3 Exercises

Exercise 5.1

Find $f+g$, $f-g$, $f \cdot g$ for the functions below. State their domain.

a) $f(x) = x^2 + 6x$ and $g(x) = 3x - 5$
b) $f(x) = x^3 + 5$ and $g(x) = 5x^2 + 7$
c) $f(x) = 3x + 7\sqrt{x}$ and $g(x) = 2x^2 + 5\sqrt{x}$
d) $f(x) = \frac{1}{x+2}$ and $g(x) = \frac{5x}{x+2}$
e) $f(x) = \sqrt{x-3}$ and $g(x) = 2\sqrt{x-3}$
f) $f(x) = x^2 + 2x + 5$ and $g(x) = 3x - 6$
g) $f(x) = x^2 + 3x$ and $g(x) = 2x^2 + 3x + 4$

Exercise 5.2

Find $\frac{f}{g}$, and $\frac{g}{f}$ for the functions below. State their domain.

a) $f(x) = 3x + 6$ and $g(x) = 2x - 8$
b) $f(x) = x + 2$ and $g(x) = x^2 - 5x + 4$
c) $f(x) = \frac{1}{x-5}$ and $g(x) = \frac{x-2}{x+3}$
d) $f(x) = \sqrt{x+6}$ and $g(x) = 2x + 5$
e) $f(x) = x^2 + 8x - 33$ and $g(x) = \sqrt{x}$

Exercise 5.3

Let $f(x) = 2x-3$ and $g(x) = 3x^2+4x$. Find the following compositions:

a) $f(g(2))$ b) $g(f(2))$ c) $f(f(5))$
d) $f(5g(-3))$ e) $g(f(2)-2)$ f) $f(f(3)+g(3))$
g) $g(f(2+x))$ h) $f(f(-x))$ i) $f(f(-3)-3g(2))$
j) $f(f(f(2)))$ k) $f(x+h)$ l) $g(x+h)$

Exercise 5.4

Find the composition $(f \circ g)(x)$ for the following functions:

a) $f(x) = 3x - 5$ and $g(x) = 2x + 3$
b) $f(x) = x^2 + 2$ and $g(x) = x + 3$
c) $f(x) = x^2 - 3x + 2$ and $g(x) = 2x + 1$
d) $f(x) = x^2 + \sqrt{x+3}$ and $g(x) = x^2 + 2x$
e) $f(x) = \frac{2}{x+4}$ and $g(x) = x + h$
f) $f(x) = x^2 + 4x + 3$ and $g(x) = x + h$

Exercise 5.5

Find the compositions

$$(f \circ g)(x), \quad (g \circ f)(x), \quad (f \circ f)(x), \quad (g \circ g)(x)$$

for the following functions:

a) $f(x) = 2x + 4$ and $g(x) = x - 5$
b) $f(x) = x + 3$ and $g(x) = x^2 - 2x$
c) $f(x) = 2x^2 - x - 6$ and $g(x) = \sqrt{3x+2}$
d) $f(x) = \frac{1}{x+3}$ and $g(x) = \frac{1}{x} - 3$
e) $f(x) = (2x-7)^2$ and $g(x) = \frac{\sqrt{x}+7}{2}$

Exercise 5.6

Let f and g be the functions defined by the table below. Complete the table by performing the indicated operations.

x	1	2	3	4	5	6	7
$f(x)$	4	5	7	0	-2	6	4
$g(x)$	6	-8	5	2	9	11	2
$f(x)+3$							
$4g(x)+5$							
$g(x)-2f(x)$							
$f(x+3)$							

Exercise 5.7

Let f and g be the functions defined by the table below. Complete the table by composing the given functions.

x	1	2	3	4	5	6
$f(x)$	3	1	2	5	6	3
$g(x)$	5	2	6	1	2	4
$(g \circ f)(x)$						
$(f \circ g)(x)$						
$(f \circ f)(x)$						
$(g \circ g)(x)$						

Exercise 5.8

Let f and g be the functions defined by the table below. Complete the table by composing the given functions.

x	0	2	4	6	8	10	12
$f(x)$	4	8	5	6	12	-1	10
$g(x)$	10	2	0	-6	7	2	8
$(g \circ f)(x)$							
$(f \circ g)(x)$							
$(f \circ f)(x)$							
$(g \circ g)(x)$							