Mat 1375 HW5 5.6 5.7

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
a) $f(x)+3$							
b) $4g(x)+5$							
c) $g(x)-2f(x)$							
d) $f(x+3)$							

Sol

a)

X	1	2	3	4	5	6	7
f(x)	4	5	7	0	-2	6	4
f(x)+3	7	8	10	3	1	9	7

f(1)+3 = 4+3 = 7

f(2)+3 = 5+3 = 8

b)

X	1	2	3	4	5	6	7
g(x)	6	-8	5	2	9	11	2
4g(x)+5	29	-27	25	13	41	49	13

4·g(1)+5 = 4·6+5 = 29

4·g(2)+5 = 4·(-8)+5 = -27

c)

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
$g(x) - 2f(x)$	-2	-18	-9	2	13	-1	-6

$g(1) - 2f(1)$
$= 6 - 2 \cdot 4 = -2$

$g(2) - 2f(2)$
$-8 - 2 \cdot 5$
$= -18$

d)

x	1	2	3	4	5	6	7
$f(x)$	4	5	7	0	-2	6	4
$f(x+3)$	0	-2	6	4	undefined	undef.	undef.

$f(1+3)$
$= f(4) = 0$

$f(5+3)$
$= f(8)$
$=$ undefined

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
a) $(g \circ f)(x)$						
b) $(f \circ g)(x)$						
c) $(f \circ f)(x)$						
d) $(g \circ g)(x)$						

Sol

a)

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

$(g \circ f)(1) = g(f(1)) = g(3) = 6$

$(g \circ f)(2) = g(f(2)) = g(1) = 5$

$(g \circ f)(3) = g(f(3)) = g(2) = 1$

$(g \circ f)(4) = g(f(4)) = g(5) = 2$

$(g \circ f)(5) = g(f(5)) = g(6) = 4$

$(g \circ f)(6) = g(f(6)) = g(3) = 6$

b)

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

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

$(f \circ g)(1) = f(g(1)) = f(5) = 6$

$(f \circ g)(2) = f(g(2)) = f(2) = 1$

$(f \circ g)(3) = f(g(3)) = f(6) = 3$

$(f \circ g)(4) = f(g(4)) = f(1) = 3$

$(f \circ g)(5) = f(g(5)) = f(2) = 1$

$(f \circ g)(6) = f(g(6)) = f(4) = 5$

c)

x	1	2	3	4	5	6
$f(x)$	3	1	2	5	6	3

$(f \circ f)(x)$ 2 3 1 6 3 2

$(f \circ f)(1) = f(f(1)) = f(3) = 2$

$(f \circ f)(2) = f(f(2)) = f(1) = 3$

$(f \circ f)(3) = f(f(3)) = f(2) = 1$

$(f \circ f)(4) = f(f(4)) = f(5) = 6$

$(f \circ f)(5) = f(f(5)) = f(6) = 3$

$(f \circ f)(6) = f(f(6)) = f(3) = 2$

(d)

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

$(g\circ g)(1) = g(g(1)) = g(5) = 2$

$(g\circ g)(2) = g(g(2)) = g(2) = 2$

$(g\circ g)(3) = g(g(3)) = g(6) = 4$

$(g\circ g)(4) = g(g(4)) = g(1) = 5$

$(g\circ g)(5) = g(g(5)) = g(2) = 2$

$(g\circ g)(6) = g(g(6)) = g(4) = 1$