Composition of Functions Notes

Inverse (x, y) $\quad f \circ g : g \to f \quad g \circ f : f \to g$

For each pair of functions, find $f \circ g$ and $g \circ f$, if they exist.

1. $f = \{(-9, -1), (-1, 0), (3, 4)\}$
$g = \{(0, -9), (-1, 3), (4, -1)\}$

$f \circ g = \{(0,-1), (-1,4), (4,0)\}$ $D = \{-1, 0, 4\}$ $R = \{-1, 0, 4\}$

$g \circ f = \{(-9,3), (-1,-9), (3,-1)\}$

2. $f = \{(-4, 3), (0, -2), (1, -2)\}$
$g = \{(-2, 0), (3, 1)\}$

3. $f = \{(-4, -5), (0, 3), (1, 6)\}$
$g = \{(6, 1), (-5, 0), (3, -4)\}$

4. $f = \{(0, -3), (1, -3), (6, 8)\}$
$g = \{(8, 2), (3, 0), (-3, 1)\}$

Find $[g \circ h](x)$ and $[h \circ g](x)$, if they exist.

5. $g(x) = 3x$
$h(x) = x - 4$

$(g \circ h)(x) = 3(x-4)$
$= 3x - 12$

$(h \circ g)(x) = 3x - 4$

6. $g(x) = x + 6$
$h(x) = 3x^2$

7. $g(x) = -2x$
$h(x) = x^2 + 3x + 2$

$(g \circ h)(x) = -2(x^2 + 3x + 2)$
$= -2x^2 - 6x - 4$

$(h \circ g)(x) = (-2x)^2 + 3(-2x) + 2$
$= 4x^2 - 6x + 2$

P389 5, 6, 22, 24, 26, 27-35 odd, 41-45 odd, 60

If $f(x) = x^2$, $g(x) = 5x$, and $h(x) = x + 4$, find each value.

8. $f[g(1)]$

$g(1) = 5(1) = 5$

$f(5) = 5^2 = 25$

9. $g[h(-2)]$

$h(-2) = -2 + 4 = 2$

$g(2) = 5(2) = 10$

10. $h[f(4)]$