

Hw p.20 1, 2 bch, 4

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

(i) $g(1) = 2(1) - 4 = -2$

$(f \circ g)(1) = f(-2) = \frac{-2+4}{2} = \frac{2}{2} = 1$

(ii) $f(-3) = \frac{-3+4}{2} = \frac{1}{2}$

$(g \circ f)(-3) = g\left(\frac{1}{2}\right) = 2\left(\frac{1}{2}\right) - 4 = 1 - 4 = -3$

(iii) $(f \circ g)(x) = f(g(x)) = f(2x-4) = \frac{(2x-4)+4}{2} = \frac{2x}{2} = x$

(iv) $(g \circ f)(x) = g\left(\frac{x+4}{2}\right) = 2\left(\frac{x+4}{2}\right) - 4 = x+4-4 = x$

2) b) $g(x) = x^3 - 2$

$y = x^3 - 2$

$x = y^3 - 2$

$x+2 = y^3$

$\sqrt[3]{x+2} = y = g^{-1}(x)$

c) $h(x) = \frac{1}{4}x + 5$

$y = \frac{1}{4}x + 5$

$x = 4y + 5$

$x - 5 = 4y$

$4(x-5) = y$

$= 4x - 20 = h^{-1}(x)$

h) $g(x) = \frac{2x}{5-x}$, $x \neq 5$

$(5-y)x = \frac{2y}{5-y} \cdot (5-y)$

$x(5-y) = 2y$

$5x - yx = 2y$

$5x = 2y + yx$

$\frac{5x}{(2+x)} = \frac{y(2+x)}{(2+x)}$

$\frac{5x}{2+x} = y = g^{-1}(x)$

4) $f^{-1}(5)$ where

a) $f(x) = 6-x$

$y = 6-x$

$x = 6-y$

$y = 6-x = f^{-1}(x)$

$f^{-1}(5) = 6-5 = 1$

b) $f(x) = \frac{10}{x+7}$

$x = \frac{10}{y+7}$

$x(y+7) = 10$

$xy + 7x = 10$

$xy = 10 - 7x$

$y = \frac{10-7x}{x} = f^{-1}(x)$

$f^{-1}(5) = \frac{10-7(5)}{5}$

$= \frac{10-35}{5}$

$= \frac{-25}{5}$

$= -5$

c) $x = \frac{2}{4y-3}$

$x(4y-3) = 2$

$4xy - 3x = 2$

$4xy = 2 + 3x$

$y = \frac{2+3x}{4x} = f^{-1}(x)$

$f^{-1}(5) = \frac{2+3(5)}{4(5)}$

$= \frac{2+15}{20}$

$= \frac{17}{20}$