Classwork 9, MATH 1113 Harrison Chapman

Name: Key

8:00 or 9:30

1. Determine the domain and range of f^{-1} for the given function f without actually finding the inverse function.

$$f(x) = \frac{3}{2-3x}$$

Domain f: $2-3x \neq 0$

$-3x \neq -2$

$x \neq 2/3$

$\rightarrow$ Range f^{-1}: $(-\infty, \frac{2}{3}) \cup (\frac{2}{3}, \infty)$

Range f: Fraction w/ constant numerator $\rightarrow f(x) \neq 0$

$\rightarrow$ Domain f^{-1}: $(-\infty, 0) \cup (0, \infty)$

2. Find the inverses of the following functions.

a) $g(x) = 5 - 7x$

$g(x) - 5 = -7x$

$\frac{g(x)-5}{-7} = x$, so: $g(x) \leftrightarrow y$, $g^{-1}(y) \leftrightarrow x$ $\rightarrow$ $\boxed{\frac{y-5}{7} = g^{-1}(y)}$

b) $h(x) = \frac{9x+5}{5x-6}$

$h(x)(5x-6) = 9x+5$

$5x\,h(x) - 6h(x) = 9x + 5$

$5x\,h(x) - 9x = 5 + 6h(x)$

$x(5h(x) - 9) = 5 + 6h(x)$

$x = \frac{5+6h(x)}{5h(x)-9}$, so:

$\boxed{h^{-1}(y) = \frac{5+6y}{5y-9}}$

c) $k(x) = 4x^3 - 6$

$k(x) + 6 = 4x^3$

$\frac{k(x)+6}{4} = x^3$

$\sqrt[3]{\frac{k(x)+6}{4}} = x$

so: $\boxed{\sqrt[3]{\frac{y+6}{4}} = k^{-1}(y)}$

3. Determine the inverse function of $(g \circ f)(x)$. $(g \circ f)^{-1} = (f^{-1} \circ g^{-1})$

$$f(x) = 9x + 7 \qquad g(x) = -10x + 8$$

$f^{-1}(y) = \dfrac{y-7}{9} \qquad g^{-1}(y) = \dfrac{y-8}{-10}$

so $\boxed{(g \circ f)^{-1}(y) = \dfrac{\left(\frac{y-8}{-10}\right) - 7}{9}}$

4. There are two functions, $h(x)$ and $L(z)$ defined by tables below.

x	2	3	4	7	5
$h(x)$	-2	-1	3	2	4

z	-3	-1	2	3	8
$L(z)$	2	1	3	4	-1

Calculate the following values.

a) $(L \circ h)(3)$

$= L(h(3))$

$= L(-1)$

$= 1$

b) $(h^{-1} \circ L^{-1})(3)$

$= h^{-1}(L^{-1}(3))$

$= h^{-1}(2)$

$= 7$

c) $(L^{-1} \circ h)(3)$

$= L^{-1}(h(3))$

$= L^{-1}(-1)$

$= 8$

d) $(h \circ L)^{-1}(3)$

$= (L^{-1} \circ h^{-1})(3)$

$= L^{-1}(h^{-1}(3))$

$= L^{-1}(4)$ $= 3$