

Math 231 HW #11

Section 7.3 #4, 11, 17,

Section 7.4 #4, 12

7.3 #4

$$F(x) = x^5 \quad G(x) = x^{1/5}$$

$$G \circ F(x) = G(x^5) = (x^5)^{1/5} = x$$

$$F \circ G(x) = F(x^{1/5}) = (x^{1/5})^5 = x$$

$$\therefore G \circ F = F \circ G$$

7.3 #11

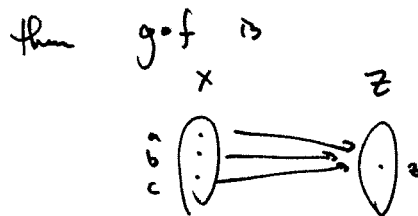
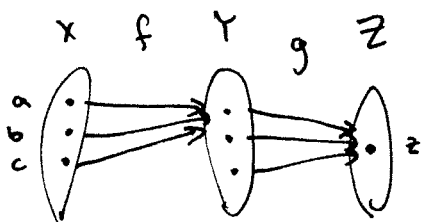
$$H = H^{-1}(x) = \frac{x+1}{x-1}$$

$$H \circ H^{-1}(x) = H\left(\frac{x+1}{x-1}\right) = \frac{\frac{x+1}{x-1} + 1}{\frac{x+1}{x-1} - 1} = \frac{\frac{x+1+x-1}{x-1}}{\frac{x+1-(x-1)}{x-1}} = \frac{2x}{+2} = x$$

$$H^{-1} \circ H(x) = \text{same since } H = H^{-1}$$

7.3 #17

Let X, Y, Z and f, g be:



$\therefore g \circ f$ is onto, but f is not onto.

7.4 #4

$\mathbb{O} =$ set of odd integers
 $2\mathbb{Z} =$ set of evens.

let $f: 2\mathbb{Z} \rightarrow \mathbb{O}$ be $f(x) = x+1$.

This is 1-1: let $f(x_1) = f(x_2)$, so $x_1+1 = x_2+1$
so $x_1 = x_2$ so it's 1-1.

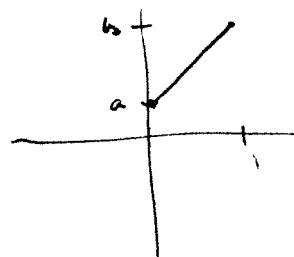
This is onto: Take some $y \in \mathbb{O}$,
since it's odd $y = 2k+1$, so $y = f(2k)$ as desired.

7.4 #12

$S = (0, 1)$

$W = (a, b)$

use this function:



it's $f(x) = (b-a)x + a$

This is 1-1: let $f(x_1) = f(x_2)$, so

$$(b-a)x_1 + a = (b-a)x_2 + a$$

$$(b-a)x_1 = (b-a)x_2$$

$x_1 = x_2$ so it's 1-1.

This is onto: Take $y \in (a, b)$, we need $x \in (0, 1)$

with $(b-a)x + a = y$, so $x = \frac{a-y}{b-a}$.

$$a < y < b, \text{ so } 0 < a-y < b-a, \text{ so } 0 < \frac{a-y}{b-a} < 1$$

so this x is in $(0, 1)$ as desired.