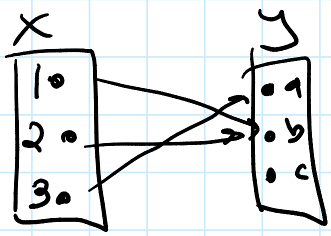
HW9

Thursday, October 24, 2019 3:13 PM

Problem 1



a) domain : $\boxed{\{1, 2, 3\}}$

codomain: $\boxed{\{a, b, c\}}$

b) $f(2) = \boxed{b}$

c) range : $\boxed{\{a, b\}}$

d) inverse image of b : $\boxed{\{1, 2\}}$

e) inverse image of c : $\boxed{\phi}$

f) ordered pairs : $\boxed{\{(1,b), (2,b), (3,a)\}}$

Problem 2

a) Define $f: \mathbb{Z} \to \mathbb{Z}$ by $f(x) = -x$

find $(f \circ f)(x)$

$f(f(x))$

$f(-x)$

$\boxed{x}$

b) Define $g: \mathbb{Z} \to \mathbb{Z}$ by $g(x) = x+2$

find $(g \circ g)(x)$

$g(g(x))$

$g(x+2)$

$\boxed{x+4}$

c) find $(f \circ g)(x)$ and $(g \circ f)(x)$

$\downarrow$ $\downarrow$

$f(g(x))$ $g(f(x))$

$f(x+2)$ $g(-x)$

$\boxed{-x-2}$ $\boxed{-x+2}$

Problem 3

Define $f: \mathbb{Z} \to \mathbb{Z}$ by $f(x) = x+1$.

a) f injective?

$\boxed{\text{yes}}$:

Choose $a, b \in \mathbb{Z}$ and assume $f(a) = f(b)$, then

$$a+1 = b+1$$

so

$$a = b.$$

b) f surjective?

$\boxed{\text{yes}}$: let $a \in \mathbb{Z}$.

then $a - 1 \in \mathbb{Z}$
and $f(a-1) = a - 1 + 1 = a$.

c) f bijective?

$\boxed{\text{yes}}$, f both injective & surjective