Function Homework

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Exercises for Section 17.1

1.

2.

3.

4.

5.

Exercises for Section 17.2

1.

2.

5

6

7

9

15

16

17

1.

2.

3.

4.

5.

6.

7.

Exercises for Section 17.4

1. (5,1), (6,1), (8,1)

3 $g \circ f = $ (1,1), (2,1), (3,3)
$f \circ g = $ (1,1), (2,2), (3,2)

5 g(f(x)) $= x + 1$
f(g(x)) $= \sqrt[3]{x^3 + 1}$

6 g(f(x)) $= 3(\dfrac{1}{x^2 + 1}) + 1$
f(g(x)) $= \dfrac{1}{(3x + 2)^2 + 1}$

7 $g \circ f = (mn + 1, mn + m^2)$
$f \circ g = ((m+1)(m+n), (m+1)^2)$

8 $g \circ f = (5(3m - 4n) + 2m + n, 3m - 4n)$
$f \circ g = (3(5m + n) - 4m, 2(5m + n) + m)$

9 $g \circ f = (m + n, m + n)$
$f \circ g = m + m = 2m$

i

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

ii

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

iii

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

Exercises for Section 17.5

1.

$$\text{Injective}$$
$$f(a) - f(b) \neq 0$$
$$6 - a - 6 + b = -a + b \neq 0$$
$$\text{Therefore, it's Injective}$$
$$\text{Surjective}$$
$$f(a) = b$$
$$6 - a = b$$
$$a = -b + 6$$
$$-b + 6 \in \mathbb{Z}$$
$$\text{Therefore, it's Surjective}$$
$$\text{Therefore, it's Bijective}$$
$$\text{Inverse}$$
$$m = 6 - n$$
$$m - 6 = -n$$
$$-m + 6 = n$$
$$f^{-1}(n) = -n + 6$$

2.

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

3.

5