Mathematics Homework Sheet 3

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Problem 1
Problem 1 (a)

For i=0:

$$f_1(-1) = -1$$
$$f_1(0) = 0$$
$$f_1(1) = 0$$

Meaning that:

$$f_1(\{-1, 0, 1\}) = \{-1, 0, 0\} = \{-1, 0\}$$

Now lets take a look at the inverse:

$$f_1(-1) = -1$$
$$f_1(0) = 0$$
$$f_1(1) = 0$$
$$f_1(2) = 1$$

These are the only values we can get -1, 0, 1. Meaning that:

$$f_1^{-1}(\{-1, 0, 1\}) = \{-1, 0, 1, 2\}$$

Now, for i=2 (the second function):

$$f_2(-1) = -4$$
$$f_2(0) = -3$$
$$f_2(1) = -2$$

Meaning that:

$$f_2(\{-1, 0, 1\}) = \{-4, -3, -2\}$$

Now lets take a look at the inverse:

$$f_2(2) = -1$$
$$f_2(3) = 0$$
$$f_2(4) = 1$$

These are the only values we can get -1, 0, 1. Meaning that:

$$f_2^{-1}(\{-1, 0, 1\}) = \{2, 3, 4\}$$

Now, for i=3 (the third function):

$$f_3(-1) = -2$$
$$f_3(0) = 0$$
$$f_3(1) = 2$$

Meaning that:

$$f_3(\{-1, 0, 1\}) = \{-2, 0, 2\}$$

Now lets take a look at the inverse:

$$f_3(x) = -1, \text{ No such } x \text{ exists in the domain of } f_3$$
$$\text{In other words, } f_3^{-1}(\{-1\}) = \emptyset$$
$$f_3(0) = 0$$
$$f_3(x) = 1, \text{ No such } x \text{ exists in the domain of } f_3$$
$$\text{In other words, } f_3^{-1}(\{1\}) = \emptyset$$

These are the only values we can get -1, 0, 1. Meaning that:

$$f_3^{-1}(\{-1, 0, 1\}) = \{0\}$$

Problem 1 (b)