

Determine if the following functions are one-to-one and onto. If they are: provide a proof; if they are not: show why not.

1. $f(x) = 6x - 9$

2. $f(x) = 3^x - 2$

The following functions are one-to-one on the specified domains. We let $Y = \text{range of } f$. This means we now have a bijection from X to Y .

3. Let $f(x) = 3^x$ where X is the set of all real numbers.

a. What is Y ?

b. Find the inverse function $f^{-1}(x)$

4. Let $f(x) = 3 + \frac{1}{x}$ where X is the set of all non-zero real numbers.

a. What is Y ?

b. Find the inverse function $f^{-1}(x)$

5. Let f be the function from $X = \{0,1,2,3,4,5\}$ to X defined by $f(x) = 4x \pmod{6}$.

a. Write f as a set of ordered pairs and draw arrow diagrams of f .

b. Is f one-to-one?

c. Is f onto?

6. Given the hash function $h(x) = x \pmod{17}$ and cells indexed 0 to 16, show how the data will be inserted into the initially empty cells. Use the collision resolution policy discussed in class. Show work.

Data: 714, 631, 26, 373, 775, 906, 509, 2032, 42, 4, 136, 1028.

7. Given the hash function $h(x) = x^2 \pmod{11}$ and cells indexed 0 to 10, show how the data will be inserted into the initially empty cells. Use the collision resolution policy discussed in class. Show work.

Data: 53, 13, 281, 743, 377, 20, 10, 796.

Do Problem 41 in section 2.2