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 \( f(x) = 4x \mod 6 \).
   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 \( h(x) = x \mod 17 \) 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 \( h(x) = x^2 \mod 11 \) 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