f(n) is injective and surjective, meaning it is bijective and therefore invertible.

iii. f(n) = 7, which is odd and so by our rule from part (ii) we can choose n = 7 -3

➔ $f^{-1}(7) = 4$

To be sure, we will plug this into the function: $f(4) = (-1)^4 * 3 + 4 = 3 + 4 = 7$

4.

a. Equivalence classes of A:

{(1,3),(3,9)}

{(2,4),(−4,−8),(3,6)}

{(1,5)}

b. $a^3 = a^3$ (mod 7) is true for any integer a, therefore R is reflexive

$a^3 = b^3$ (mod 7) ➔ $b^3 = a^3$ (mod 7) for all integers a and b, therefore R is symmetric

$a^3 = b^3$ (mod 7) and $b^3 = c^3$ (mod 7) ➔ $a^3 = c^3$ (mod 7) for all integers a, b, and c, therefore R is transitive

Since R is reflexive, symmetric, and transitive, we know that it is an equivalence relation.

Equivalence classes of R:

a^3 (mod 7) = 0

a^3 (mod 7) = 1

a^3 (mod 7) = 6

5.

a. We are given the function f: A ➔ B such that |A| = |B| = n

i. We want to show that if f is injective, then f is surjective.

If f in injective then every element in A maps to a unique element in B. This means that there are n unique mappings of elements in A to elements in B. The definition of our function tells us that we have n elements in B, and since we have n mappings from A to B, every element in B must have a pre-image in A. This is the definition of a surjective function and therefore we know that if f is injective, then f is surjective.

ii. We want to show that if f is surjective, then f is injective.