Assignment 0

Due on 2020-10-15, 11.59 PM

Introduction

1. A function f : X → Y is said to be a bijection if it is both a function and its inverse function is also a function. Prove that if f : X → Y is a bijection, then the function g : Y → X defined by g(y) = x if and only if f(x) = y is also a bijection.

2. Let A = {1, 2, 3, 4} and B = {a, b, c, d}. Define a function f : A → B by f(x) = x + 1. Find the domain of f and determine if it is injective, surjective, or bijective.

3. Consider the function f : R → R defined by f(x) = 2x. Determine if f is injective, surjective, or bijective.

4. Consider the function f : R → R defined by f(x) = x^2. Determine if f is injective, surjective, or bijective.

5. Consider the function f : Z → Z defined by f(x) = x^2. Determine if f is injective, surjective, or bijective.

6. Consider the function f : N × N → N defined by f((x, y)) = 2^x * 3^y. Determine if f is injective, surjective, or bijective.

7. Let A = {1, 2, 3, 4} and B = {a, b, c, d}. Define a function f : A → B by f(x) = b. Find the range of f and determine if it is injective, surjective, or bijective.

8. Let A = {1, 2, 3, 4} and B = {a, b, c, d}. Define a function f : A → B by f(x) = a if x is even, and f(x) = b if x is odd. Find the range of f and determine if it is injective, surjective, or bijective.

9. Let A = {1, 2, 3, 4} and B = {a, b, c, d}. Define a function f : A → B by f(x) = x if x is even, and f(x) = d if x is odd. Find the range of f and determine if it is injective, surjective, or bijective.

10. Let A = {1, 2, 3, 4} and B = {a, b, c, d}. Define a function f : A → B by f(x) = x^2 if x is even, and f(x) = 3 if x is odd. Find the range of f and determine if it is injective, surjective, or bijective.

11. Let A = {1, 2, 3, 4} and B = {a, b, c, d}. Define a function f : A → B by f(x) = x if x is even, and f(x) = x + 1 if x is odd. Find the range of f and determine if it is injective, surjective, or bijective.

12. Let A = {1, 2, 3, 4} and B = {a, b, c, d}. Define a function f : A → B by f(x) = x + 1 if x is even, and f(x) = x if x is odd. Find the range of f and determine if it is injective, surjective, or bijective.

13. Let A = {1, 2, 3, 4} and B = {a, b, c, d}. Define a function f : A → B by f(x) = x^3 if x is even, and f(x) = x^2 if x is odd. Find the range of f and determine if it is injective, surjective, or bijective.

14. Let A = {1, 2, 3, 4} and B = {a, b, c, d}. Define a function f : A → B by f(x) = x^2 if x is even, and f(x) = x^3 if x is odd. Find the range of f and determine if it is injective, surjective, or bijective.

15. Let A = {1, 2, 3, 4} and B = {a, b, c, d}. Define a function f : A → B by f(x) = x^3 if x is even, and f(x) = x^2 if x is odd. Find the range of f and determine if it is injective, surjective, or bijective.

16. Let A = {1, 2, 3, 4} and B = {a, b, c, d}. Define a function f : A → B by f(x) = x^2 if x is even, and f(x) = x^3 if x is odd. Find the range of f and determine if it is injective, surjective, or bijective.