Math 2001 Assignment 32

Your name here

Due Monday, November 10

Reading 1. Scheinerman, §24 (pp. 167–175)

Definition 2. Suppose A and B are sets. A *bijection* from A to B is a subset $f \subset A \times B$ with the following two properties:

(i) for any $a \in A$ there is a unique $b \in B$ such that $(a, b) \in f$;

(ii) for any $b \in B$ there is a unique $a \in A$ such that $(a, b) \in f$.

Two sets have the same *cardinality* if and only if there is a bijection between them.

Problem 3. Let $A = \{1, 2, 3, 4\}$ and $B = \{1, 2, 5, 6\}$. Let

$$f = \{(1, 2), (2, 6), (3, 1)\}.$$

What element should be added to f to make it a bijection from A to B? Explain your answer.

Problem 4. Scheinerman, §24, #4

Problem 5. Scheinerman, §24, #5

Problem 6. Prove that having the same cardinality is an equivalence relation on sets. Your proof will have three parts:

(i) To prove that the relation is reflexive, you need to show that for any set A there is a bijection from A to itself. (Hint: Δ_A.)

(ii) To prove that the relation is symmetric, you need to show that if there is a bijection f from A to B then there is a bijection from B to A. (Hint: f^{-1}.)

(iii) To prove that the relation is transitive, you need to show that if there are bijections f from A to B and g from B to C then there is a bijection from A to C. (Hint: $g \circ f$.)