Math 103 Homework Set # 4[1]

Due on April 11, 2006, at 12:30

Let $\tau := \{1, 2\}$, $A_1 := \{a, b\}$, $A_2 := \{x, y, z\}$, $A'_1 := \{b\}$ and $A'_2 := \{x, z\}$. Let F denote the set of all functions $f : A_1 \to A_2$ whose domain is A_1.

1) Determine all the elements of F.

2) Determine those elements of F which are onto and those which are one-to-one.

3) Determine the image of A'_1 and the inverse image of A'_2 under the elements of F.

4) Find all functions $g : \tau \to A_1 \cup A_2$ whose domain is τ and satisfy

$$\forall \alpha \in \tau, \quad g(\alpha) \in A_\alpha.$$

5) Let S denote the set of all functions $g : \tau \to A_1 \cup A_2$ which satisfy the conditions of Problem 4. Let $h : S \to A_1 \times A_2$ be the function defined by $h(g) := (g(1), g(2))$, prove that h is a bijection.

6) Let $f : A \to B$ be a function and A_1 and A_2 be subsets of A. Prove that in general $f(A_1 \cap A_2) \neq f(A_1) \cap f(A_2)$.

[1]Each problem will be graded out of 20 points.