Unit B3 Exercises: Supplemental Notes, 10/6/03

Exercise 1: Corporate Organization

A. Suppose that you answered to this part as follows:
$P = C \cup M \cup S$
$C = \{c\}$
$M = \{m, n\}$
$S = \{s, t, u\}$
$R = \{(s, m), (t, m), (u, n), (m, c), (n, c)\}$

B. If you answered NO to this part saying that *R* is not one-to-one, that is a wrong answer. Recall that one-to-one is the same thing as injective. This is a property of a function. Before being able to check injectiveness, you must check whether the relation is a function. This *R* is actually not a function for another reason. The key is that *c* does not report to anyone. Thus, not all the input elements are mapped.

As I said in class, when you check the two conditions for a relation to be a function, you must check the arrows going out of the **input** set. For example, for $f: A \rightarrow B$, *A* is the input set. To check whether $R: P \times P$ is a function, the input and the output set are the same. But you still focus on the outgoing parts of the arrows. If there is at least one element that does not have an arrow, it's not a function. If there is at least one element that has two arrows going out, it's not a function either. However, it does not matter how the output set is mapped (or even not mapped).

Once you know that the relation is a function, then, you can analyze function properties such as surjectiveness and injectiveness. To analyze these properties, you focus on the **output** set.

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