

**MATH 109 WINTER 2007 HOMEWORK 6, DUE 2/16/07 IN
CLASS**

(All exercise and page numbers refer to Eccles.)

1. READING AND PRACTICE

Read Chapters 8-9 of the text, and do as many of the end of chapter exercises as possible.

2. EXERCISES TO SUBMIT ON FRIDAY 2/16

1. Prove that if S is a set with finitely many elements and $f : S \rightarrow S$ is an injective function, then f is actually bijective. Give an example which shows that the same result does not hold in general for infinite sets S .

2. Let A, B, C be sets. Let $f : A \rightarrow B$, $g : B \rightarrow C$, and $h : A \rightarrow B$ be functions.
 - (a). Suppose that $g \circ f$ is injective. Prove this implies that f is injective. Give a counterexample to show that g is not necessarily injective.
 - (b). Prove that if f and g are both injective, then $g \circ f$ is injective.
 - (c). Prove that if g is injective and $g \circ f = g \circ h$, then $f = h$.

3. In the Exercises II which begin on page 115 of the text, do #14, 16, 18, 19, 20.

Remark. In #16, you should explain why you think each function is injective, surjective, or bijective (or not). But your justification can rely on your intuitive knowledge of the properties of real numbers and doesn't have to be too formal. Arguing from a graph is OK in this problem.