Problem Set 6 Foundations Due 3/23/2009

Four of these problems will be graded, with each problem worth 5 points. Clear and complete justification is required for full credit. You are welcome to discuss these problems with anyone and everyone, but must write up your own final submission without reference to any sources other than the textbook and instructor. Submissions must be on clean paper with no ragged edges.

1. Let a and b be real numbers. Give an example of a bijection from $[0,1]$ to $[a,b]$.

2. Let a and b be real numbers. Any function from $[0,1]$ to $[a,b]$ must be a bijection.

3. An increasing function $f:\mathbb{R} \to \mathbb{R}$ must be injective.

4. An increasing function $f:\mathbb{R} \to \mathbb{R}$ must be surjective.

5. Let $f: A \to B$ and $g: B \to C$ be surjective functions. Show that $g \circ f$ is surjective.

6. Let $f: A \to B$ and $g: B \to C$ be injective functions. Show that $g \circ f$ is injective.

7. The sum of injective functions is injective.

8. The product of surjective functions is surjective.