

March 3, 2008

Office hours -Tuesday 11-12 MSC

Problem 4.12

Determine which of the following statements are true. Give proofs for the true statements and counterexamples for the false ones.

1. Every decreasing function from \mathbb{R} to \mathbb{R} is surjective
2. Every non-decreasing function from \mathbb{R} to \mathbb{R} is injective.
3. Every injective function from \mathbb{R} to \mathbb{R} is monotone.
4. Every surjective function from \mathbb{R} to \mathbb{R} is unbounded.
5. Every unbounded function from \mathbb{R} to \mathbb{R} is surjective.

Problem 4.35

Let A and B be finite sets. Consider $f : A \rightarrow B$ and $g : B \rightarrow A$. Answer each question below by providing a proof or a counterexample.

1. If $f(g(y)) = y$ for all $y \in B$, does it follow that f is a bijection?
2. If $g(f(x)) = x$ for all $x \in A$, does it follow that $f(g(y)) = y$ for all $y \in B$?