

Discrete Structures, Fall 2014, Self-graded Homework 8

You must write the solutions to these problems legibly on your own paper, with the problems in sequential order, and with all sheets stapled together.

1. Define $f : \mathbb{R} \rightarrow \mathbb{R}$ by the rule $f(x) = x^3 - 1$.
 - (a) Is f 1-1? Prove or give a counterexample.
 - (b) Is f onto? Prove or give a counterexample.
2. Let X , Y , and Z be sets. Suppose $f : X \rightarrow Y$ and $g : Y \rightarrow Z$ are functions. If $g \circ f$ is 1-1, is it true that g is 1-1? Prove or give a counter-example.

Suggestion/hint/idea: Make up some arrow diagrams first to try to work out if this is true or if you should find a counter-example. Note that an arrow diagram suffices for a counter-example (since it defines a function), but in general, an arrow diagram will not suffice for universal proof of a function property.