Math 215 – Fall 2017

Practice Homework 15 – Assigned November 6th, due November 9th

Note: Remember that you must show your work to get full credit for a problem. For this assignment, please don't forget that you can define a function with a finite domain and codomain using a sagittal diagram. This is one way to create a quick example of a function with required properties.

1. Let $f : A \to B$ and $g : B \to C$ be functions. Assume that f and g are both injective functions. Either prove that $g \circ f : A \to C$ is always injective, or provide a counter-example.

2. Let $f : A \to B$ and $g : B \to C$ be functions. Assume that f and g are both surjective functions. Either prove that $g \circ f : A \to C$ is always surjective, or provide a counter-example.

3. Let $f : A \to B$ and $g : B \to C$ be functions. Assume that f is a surjective function and g is an injective function.

   (a) Either prove that $g \circ f : A \to C$ is always injective, or provide a counter-example.

   (b) Either prove that $g \circ f : A \to C$ is always surjective, or provide a counter-example.

4. Let $f : A \to B$ and $g : B \to C$ be functions. Assume that f is an injective function and g is a surjective function.

   (a) Either prove that $g \circ f : A \to C$ is always injective, or provide a counter-example.

   (b) Either prove that $g \circ f : A \to C$ is always surjective, or provide a counter-example.

5. Create functions $f : A \to B$ and $g : B \to C$ such that g is **not** injective, but $g \circ f$ **is** injective.