

Math 11200, Sec. 40
Homework 3

1. Come up with a function $f : \mathbb{N} \rightarrow \mathbb{N}$ that is:

- (a) Onto but not one-to-one (this one is a little tricky, but we saw a similar function in class)
- (b) One-to-one but not onto
- (c) Both one-to-one and onto (such a function is called *bijective*) but is not the identity function (that is, it does not simply send every element to itself)
- (d) Has finite image (that is, its image has only finitely many elements)

2. Book problems 1.7, 1.8, 1.9

Extra Credit: Find an onto map $f : \mathbb{N} \rightarrow \mathbb{Z} \times \mathbb{Z}$. [Hint: if you plot the points of $\mathbb{Z} \times \mathbb{Z}$ (they're like the vertices on a piece of infinite graph paper with one vertex specially labeled as the "origin") then there are a number of attractive geometric constructions]