

**Math 42**  
**HW06, Fall 2014**  
**Due Wed Sep 17**

Three problems from Ducks: (3.13) 3, 11, 12.

Plus two other problems:

1. Let  $B = \{-4, 2, 3, 6, 7, 13, 15\}$ . In the following, to describe a particular function that you have made up, you can either write down a formula or draw an arrow picture.
  - (a) Give an example of a nonempty set  $A$  and a function  $f : A \rightarrow B$  such that  $f$  is one-to-one, but **not onto**. What is the smallest value that  $|A|$  can take? What is the largest value that  $|A|$  can take (or can  $|A|$  be arbitrarily large)? Justify your answers.
  - (b) Give an example of a nonempty set  $C$  and a function  $g : C \rightarrow B$  such that  $g$  is onto, but **not one-to-one**. What is the smallest value that  $|C|$  can take? What is the largest value that  $|C|$  can take (or can  $|C|$  be arbitrarily large)? Justify your answers.
2. In the following, to describe a particular function that you have made up, you can either write down a formula or draw an arrow picture.
  - (a) Give an example of a function  $f : \mathbf{Z} \rightarrow \mathbf{Z}$  that is one-to-one but not onto. Explain how you know that  $f$  is one-to-one, and how you know that  $f$  is not onto.
  - (b) Give an example of a function  $g : \mathbf{N} \rightarrow \mathbf{N}$  that is onto but not one-to-one. Explain how you know that  $g$  is onto, and how you know that  $g$  is not one-to-one.

For inspiration and a hint of sorts, check out:

<http://www.ibuzzle.com/editorials/9-9-2002-26002.asp>