

MATH 113: DISCRETE STRUCTURES
READING QUESTIONS FOR WEDNESDAY WEEK 1

“Reading” assignment. Functions video lecture (distributed via email) and accompanying notes.

Problem 1. Label each of the following functions as injective, surjective, bijective, or boring. (We will briefly call a function *boring* if it is neither injective nor surjective. No need to justify your answers.)

(a) $\{(1, c), (2, b), (3, a)\} = f : \{1, 2, 3\} \rightarrow \{a, b, c\}$

(b) $\{(1, c), (2, b), (3, a)\} = g : \{1, 2, 3\} \rightarrow \{a, b, c, d\}$

(c) $\cos : \mathbb{R} \rightarrow \mathbb{R}$

(d) $\{(\heartsuit, \top), (\clubsuit, \top), (\diamond, \perp), (\spadesuit, \top)\} = h : \{\heartsuit, \clubsuit, \diamond, \spadesuit\} \rightarrow \{\top, \perp\}$

Problem 2. Find an example of an injective function $\mathbb{N} \rightarrow \mathbb{N}$ which is not surjective; separately, find an example of a surjective function $\mathbb{N} \rightarrow \mathbb{N}$ which is not injective.