Module 6B: Surjective, injective, and bijective functions

MTH 225
12 Oct 2020

Agenda

- Review of Daily Prep activity + Q/A time
- Activities:
  - Constructing functions with given surjective/injective properties
  - Inverse images
- Q&A and quizzing

Consider the mapping $f : \{1, 2, 3, 4, 5, 6\} \to \{a, b, c\}$ given by $f = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ a & a & b & b & b & c \end{pmatrix}$. Then f is

- Injective
- Surjective
- Bijective
- Neither injective nor surjective
- Not a function in the first place

To 0

Consider the mapping $f : \{1, 2, 3, 4, 5, 6\} \to \{a, b, c\}$ given by $f(1) = b$, $f(1) = a$, $f(2) = b$, $f(3) = c$, $f(4) = a$. Then f is

- Injective
- Surjective
- Bijective
- Neither injective nor surjective
- Not a function in the first place

Let `phone_number` be a Python function from the set of all GVSU students to the set of all 10-decimal digit integers, and plugging in a person into this function returns their primary phone number as listed in Banner. This function is

- Injective
- Surjective
- Bijective
- Neither injective nor surjective

To 0

Function construction activity -- Jamboard

Let A and B be finite sets and suppose $|A| > |B|$. Then

it's not possible to construct an injective function from A to B.

it's not possible to construct an surjective function from A to B.

it IS possible to build a function from A to B that has any combination of injective/surjective we want.

To 0

True or false?: It's possible to build a *bijective* function from $\mathbb{Z} = \{..., -3, -2, -1, 0, 1, 2, 3, ...\}$ to $\mathbb{N} = \{0, 1, 2, 3, ...\}$.

True

False

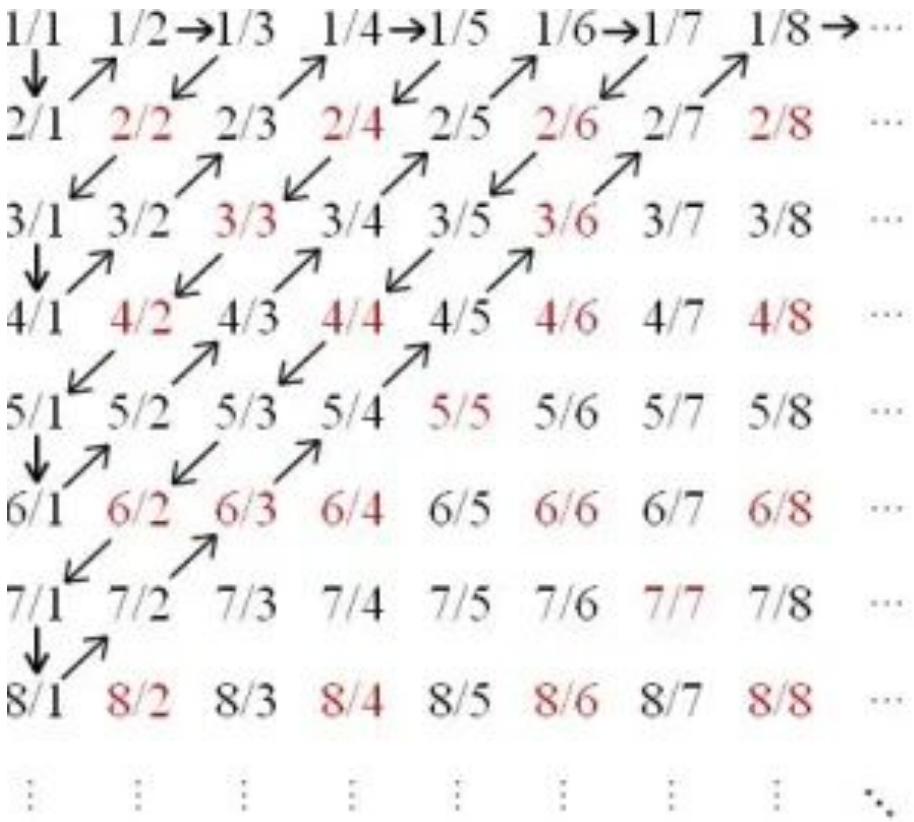
To 0

Recall $\mathbb{Q}$ is the set of all *rational numbers* -- numbers that can be written as a fraction of two integers in lowest form. True or false: It's possible to build a *bijective* function from $\mathbb{Q}$ to $\mathbb{N}$.

True

False

To 0


1/1 1/2 1/3 1/4 1/5 1/6 1/7 1/8 ⋯
2/1 2/2 2/3 2/4 2/5 2/6 2/7 2/8 ⋯
3/1 3/2 3/3 3/4 3/5 3/6 3/7 3/8 ⋯
4/1 4/2 4/3 4/4 4/5 4/6 4/7 4/8 ⋯
5/1 5/2 5/3 5/4 5/5 5/6 5/7 5/8 ⋯
6/1 6/2 6/3 6/4 6/5 6/6 6/7 6/8 ⋯
7/1 7/2 7/3 7/4 7/5 7/6 7/7 7/8 ⋯
8/1 8/2 8/3 8/4 8/5 8/6 8/7 8/8 ⋯
⋮ ⋮ ⋮ ⋮ ⋮ ⋮ ⋮ ⋮ ⋱

Have a great day 😀

Check your info sources to stay up to speed!