MTH 225: Discrete Structures for Computer Science 1

Daily Preparation, Module 6B: Surjective, injective, and bijective functions

Due by: 11:59pm ET, Tuesday, October 13

Estimated time requirement: About 45-60 minutes for the whole assignment. *If you have worked on this assignment for 30 minutes and you're not at least halfway done, DON'T work any further* — instead, *stop and ask for help* on the `#dailyprep` channel on CampusWire. Remember these are graded just on completeness and effort — try to be right and understand everything, but don't get bogged down if you get stuck. Just give a good effort and move on, and ask a question.

Overview

We're just learned about the mathematical idea behind functions. In Module 6B we make a distinction between three different kinds of function behavior, all based on the way that inputs and outputs are paired off: **surjective** functions (where a function "hits" every possible point in the codomain), **injective** functions (where there are no "collisions" in the codomain), and **bijective** functions (where a function is both injective and surjective).

What you will learn

Learning Targets addressed in this module:

- **SF.3 (Core)**: I can determine whether or not a given relation is a function, determine the domain and codomain of a function, and find the image and preimage of a point using a function.
- **SF.4**: I can determine whether a function is injective, surjective, or bijective.

BEFORE your class meeting, use the Resources for Learning (below) to learn how to do the following:

- Determine whether a function given as a diagram or table is an injection, surjection, or bijection.
- Find the image and inverse image of a set under a function.

DURING AND AFTER your class meeting, you will learn how to do the following:

- Determine whether a function given as a formula or verbal rule is an injection, surjection, or bijection.

Resources for Learning

For this module, I recommend you watch the videos first and THEN read in the text.

Video: These were made by me for MTH 210 (Communicating in Mathematics) but they work for MTH 225 as well.

- Injective functions (6:49) https://www.youtube.com/watch?v=fGYaaKryZp4&list=PL2419488168AE7001&index=87
- Surjective functions (9:03) https://www.youtube.com/watch?v=jVniPMIexQE&list=PL2419488168AE7001&index=89

Text: Read the following from *Discrete Mathematics: An Open Introduction*:

- In Section 0.4, start at the section "Surjections, Injections, and Bijections" and continue through the end.
- The interactive exercises at the end are very helpful for testing your understanding. You should do them.

You are free to search for and use other resources in addition to, or instead of the above, as long as you can work the exercises below.

Exercises

The exercises are on the following Google Form: https://bit.ly/2GItLnS

Submission, grading, and getting help

Submitting your work: Your work is to be done on Classkick using the link/code above. Classkick saves your work as you go, so there's nothing to submit – just do the work and you're good.

How this is graded: Daily Prep assignments are graded on the basis of *completeness and effort*: If your submission has **all parts completed** (no blank entries, even if left blank accidentally) and **a good-faith effort to provide a correct solution or explanation is given** (no responses of "I don't know" or "I didn't understand") and **the work is submitted on time**, it gets a "check". Otherwise it gets an "x". If you are stuck on an item, you're expected to ask questions and give your best effort.

Getting help on this assignment: *You may work with others on this assignment, but you may not copy each others' answers.* Evidence of copying will be treated as academic dishonesty. You may also ask questions on the #dailyprep channel on CampusWire, but you may not ask simply to be given the answers; giving and receiving answers on CampusWire will be treated as academic dishonesty.