Math 250: Daily Preparation

Overview

Two of the most important concepts related to functions are the notions of *injection* and *surjection*. In our next class meeting, we formalize the definition of each of these ideas and begin to see how we prove statements that assert that a function is an injection and/or a surjection. Throughout, there are critical quantifiers to tend to, and we will see several different standard proof techniques at work.

Basic learning objectives

These are the tasks you should be able to perform with reasonable fluency **when you arrive at our next class meeting**. Important new vocabulary words are indicated *in italics*.

- Know, by heart, the definition of the term *injection*. That is, you should be able to easily complete the sentence "A function $g : P \to Q$ is an *injection* provided that . . ."
- Know, by heart, the definition of the term *surjection*. That is, you should be able to easily complete the sentence "A function $g : P \to Q$ is an *surjection* provided that . . ."
- Know the negations of each of the two preceding definitions.
- Be able to give examples (using arrow diagrams for functions with finite domains and codomains) of functions that are injective, not injective, surjective, and not surjective.

Advanced learning objectives

In addition to mastering the basic objectives, here are the tasks you should be able to perform in the near future **with practice and further study**:

- Be able to prove that a given function is an injection or not an injection.
- Be able to prove that a given function is a surjection or not a surjection.

Resources

Reading: Read pages 309-313

Watching: Here are some additional resources that have been developed to support your learning:

- Screencast 6.3.1: http://gvsu.edu/s/vs
- Screencast 6.3.3: http://gvsu.edu/s/vt
- After class, it will be well worth your time to watch Screencasts 6.3.2 and 6.3.4, which are devoted to how we prove that a function is an injection or surjection.

Continued →

Questions

Respond to the following questions on separate paper, as explained in the document that describes guidelines and expectations for daily preparatory assignments. You should be prepared to show me your responses at the start of class; I will review your work briefly sometime before the end of class.

1. Complete Preview Activity 1 in Section 6.3.
2. Complete Preview Activity 2 in Section 6.3.
3. True or false: a function can be an injection while not being a surjection. Justify your answer appropriately.
4. What is the key lesson to learn from the two examples found on p. 313?