Math 330 Section 3 Homework 06

Written assignments:
  First submission: Wednesday, September 30
  Last submission: Wednesday, September 30(!)
These assignments will be GRADED ONLY ONCE!

Status - Reading Assignments:

Here is the status of the reading assignments you were asked to complete by this date.

Textbook: all of ch.1 - 4 and ch.5.1 - 5.3

Other course material (course materials page):
  "Logic part 1", "Sets part 1", "Sets part 2", "Functions part 1", "Lecture Notes: Math 330 - Additional Material" ch.4.1 (Inclusion Lemma)

New reading assignments:

Reading assignment 1 - due: Monday, September 28 if possible, **no later than Wwednesday, September 30**

Read carefully the remainder of ch. 5 in the book. That's just one page but you need to understand why both definitions of a function given there coincide. I shall lecture about this on Monday, so it is to your advantage if you have read this beforehand

Reading assignment 2 - due: Wednesday, September 30

Click the link "Functions part 2" and read it according to the guidelines in the Additional course materials web page.

What's important for quizzes and exams:
  1. Write down both B/G definitions of a functions and of a graph from memory.
  2. Given a function such as $f(x) = (x + 1)^2$ with domain $A = \{-2, 0, 2\}$, write down its graph $\Gamma(f)$.

Written assignments: The proofs need not be as exact as doing proofs from B/G but your reasoning must be concise and intelligible. Draw some pictures to illustrate!

Written assignment 1:

Do exercise 2.2.1 in "Functions part 2". Be sure to first work through examples 2.2.5 and 2.2.6.

If you decide that f is NOT injective then demonstrate with a specific counterexample of two numbers that illustrate why. If you decide that f is NOT surjective then demonstrate with a specific counterexample of a number in the codomain that does not belong to the range f(domain).

Written assignment 2:

Do exercise 2.2.2 in "Functions part 2". Same instructions as in the previous assignment!

Written assignment 3:

Do exercise 2.8.1 in "Functions part 2". Hint: use $f(x) = x^2$. But what to choose for domain A and codomain B?

Written assignment 4:

Example 2.10.1 and exercise 2.10.1 in "Functions part 2" together state that

   injective $\circ$ injective $=$ injective,

   surjective $\circ$ surjective $=$ surjective

The following assignment is part of exercises 2.10.2 and 2.10.3 in "Functions part 2".

Find functions $f : \{a\} \longrightarrow \{b_1, b_2\}$ and $g : \{b_1, b_2\} \longrightarrow \{a\}$ such that $h := g \circ f : \{a\}$ is bijective but such that it is **not true** that both f, g are injective and it is also **not true** that both f, g are surjective.

Hint: There are not a whole lot of possibilities. Draw possible candidates for f and g in arrow notation as on p.118. You should easily be able to figure out some examples. Think simple!

To get full credits, indicate clearly where injectivity or surjectivity is not obtained.