Intro to Proofs Day 13 Outline (This class meets for 1 hour and 50 minutes.)

**Need 3.4/3.5 worksheets, quizzes to hand back, snacks/pens**

**Synthesis Activity** [0-10 minutes]

* Karissa presents: For all real numbers x and y if x is rational and y is irrational then x+y is irrational.
* Another way: Assume x is rational, y is irrational, and x+y rational. Then x+y-x is rational because rationals are closed under subtraction. So y is rational, contradiction.

**Talk about quiz briefly** [10-15minutes]

**Preview Activity [15-40 minutes]**

* Slide 2/3:
  + Notice the “For all real numbers a and b…” means we say “let a and b be real numbers”
  + Go over the logical equivalences with disjunctions.
  + Contrapositive is easier to prove, so is using the disjunction.
  + Why take the contrapositive if you don’t use it?
  + Weird indentations
  + Proposition = Theorem
* Slide 4/5:
  + Why can you assume 1-x>0? (because x<1)
  + How does contradiction work?
  + How do you decide to use contradiction?
  + Took a few times to read through
  + Is there more than one way to do the algebra?
* Slide 6/7:
  + For the proof to work AND for the statement to be true need x not equal to 0. Do we have to state x\neq 0?
  + If part of the hypothesis says a number is irrational you don’t have to say anything about not being able to assume there is a quotient. NO
  + How do you decide to use contradiction? Vs. Contrapositive
  + How did they know to take 1/x\* xy?
  + Q on LaTeX \Q
  + Conclusion long?
* Slide 8:
  + The proof is wrong. (Explain why. Lots of people said “need proof by contradiction” – rapidly spreading disease.)
  + The proposition is false.
  + If a proposition is false you cannot prove it (not with contradiction or any other type of proof)
* Slide 9:
  + Mention how to talk about closure. Closure of A SET under an OPERATION

**Section 3.4/3.5 worksheet [40-50 minutes]**

* The division algorithm. Do a couple of examples together as a class.
* They work on page 1

---------------------------------BREAK--------------------------------------------

**Section 3.4/3.5 – Page 2 [60-75 minutes]**

* Go over top of page 2
* 5 minutes to make guesses on what cases one might use.
* Go over as a class.

**Section 3.4/3.5 – Page 3 [75-85 minutes]**

* Do Theorem 1 together, as an outline.
* Display solution proof

**Section 3.4/3.5 – Page 4 [85-100 minutes]**

**Play, Conjecture, Prove [100-110 minutes]**

* River crossing/bridge crossing problem

For next time: Preview Activity #9 on induction

Synthesis #12: Section 3.4 #7 on page 138. (An outline is okay.)