Intro to Proofs Day 11 Outline (This class meets for 110 minutes.)

**Cards, 3.5 Worksheet Copies, new proof portfolio problems/proof portfolio reflection, scrap paper for chicken nugget problem, cases in proofs copies.**

**Business:**

* Go over their comments on keep/stop/start: Will be conscious of what I assign, give page numbers of proofs to read in, more problems like zombie/farmer one. (Thoughts on switching groups?)
* Hand out new proof portfolio stuff
* Collect exams!

PART 1: Proof by Cases (0-25 minutes)

\*\*We are going to skip absolute value proofs\*\*

**A proof using congruence. [5-20 minutes]**

Last time we discussed the cases for Theorem 3 on worksheet 3.5. Another way to think about it:

* Have students write down all the integers that are congruent to 0 (mod 5), 1 (mod 5),… (on slide)
* Notice this is all the integers! And all the integers fall into just one of the sets.

Split up cases among groups. (0,1,2,3,4). Have students write their case on the board. (One group is why is 0 not included in theorem statement)

**When to use cases/what cases [20-25 minutes]**

* Hypothesis using “or” (your cases are given!)
* Congruence modulo n, divide up that way
* Even/odd
* Division is just congruence…

PART 2: Division Algorithm (25-50)

**Discuss Preview Activity [ 25-30 minutes]**

* Slide 5: How to divide n is in an integer into cases
  + Some students did even/odd
  + Some students did type 0/1/2
  + Can do any number though!
* Slide 6 – same thing
  + Why is this relevant for proof that sqrt{3} is irrational?
  + Show the proof that sqrt{18} is irrational

**Discuss a more advanced level of understanding of congruence [30-35 minutes]**

* Have students think of 2-3 pairs of integers a and b with b>0
* Write down the q and r that comes from the division algorithm.
* Determine integer(s) x such that a = x (mod b).
* Is a = r (mod b)?
* What do you notice?

**Contrapositive, cases and there exists [35-55 minutes]**

* Have students work through page 2of 3.5 worksheet

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

**How many cases? [65-85 minutes]**

* Have students work on page 3 of 3.5 worksheet

**Chicken nugget problem [90-110 minutes]**

* Chicken nuggets come in boxes of 3 or 5.
* Which numbers of chicken nuggets can you order?
* How would you prove your answer?

Synthesis: Write a formal proof that sqrt{3} is irrational. Do proof by cases, which cases worksheet. Preview Activity on induction.