Intro to Proofs Day 7 Outline (This class meets for 110 minutes.)

**Section 3.2 worksheet**

***Show upcoming events. Questions on proof portfolio?***

PART 1: Synthesis Stuff (5-20 minutes)

**Synthesis Presentation** [5-20 minutes]

* Section 2.4 Exercise 3 (a), (e)
  + Negate “There exists a rational number x such that x>sqrt{2}”. For all rational numbers x, x<= sqrt{2}
  + Negate “For all x in Z, if x^2 is odd then x is odd”. There exists x in Z such that x^2 is odd and x is even.
* Section 2.4 Exercise 4 (a), (c)
  + There exists integers m and n such that m>n
  + For each integer m, there exists an integer n such that m>n.
  + Have students determine truth value.

PART 2: Section 3.1 Worksheet (20-50 minutes)

**Worksheet 3.1 – Activity 1**

* Work alone on Questions 1-5. When you are finished you will raise your hand and find some space on the whiteboard where you will together try to construct a know-show table.
* Have a student present their know-show table.

PART 3: Congruence (50-60 minutes)

**Preview Activity:**

* Slide 2:
  + Only 1 wrong answer. Try to list these in roster notation
* Slide 3:
  + 3 lines as logically equivalent vs. congruent
  + Translating between modulo and divides
  + What does modulo mean?
* Slide 4/5:
  + Examples: (111,1), (28, 3), (10,5), (38, -3), (38,-2): ONE of these is wrong. Which one?
  + Everyone got this right using the definition: -7-2 is not divisible by 5
* Slide 6:
  + Show last answer
* Slide 7:
  + A is a type 1 is integers means a= 3m+1 for some integer m = { …, -2, 1, 4, 7,…}
  + Congruent to 1 modulo 3 means 3 | (a-1). There exists integer k such that 3k=a-1
* Congruence is “clock arithmetic”. If it’s 11 o’clock now what time will it be in 4 hours?, 3PM. You added to 12 and started over. Military people would say its 1500. But 15 = 3 mod 12.

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

PART 3: On Congruence Continued [60-100]

**Activity 2 [60-75 minutes]**

* Have students work on in groups.
* Go over any parts they are confused about

**Activity 3/4 [75 -100 minutes]**

* Have students work in groups on activities 3 and 4.

PART 4: Logical equivalences [100-110]

**Go over preview activity on contrapositive**

* Slide 8 – everyone did correctly
* Slide 9 –
  + Start a know-show table for each. Have them fill in. Then what?
  + Show Hee Oh, and Laplace/Senechal answers. Maybe Duane answer.

**If time: Have them start Worksheet 3.2**

Preview Activity for next time: Watch video on proof by contrapositive (3.2.1) and biconditional (3.2.3). What assume and what would you prove in a proof by contrapositive of… What two if then statements do you need to prove for biconditional statement. Practice Negating statements

Synthesis activity for next time: 3.1 #1 pick ONE of (a)-(c). #19 (a) and (c) page 100-101