Intro to Proofs Day 5 Outline (This class meets for 110 minutes.)

**Need cards**

PART 1: Wrap ups from last time (65 minutes)

**Synthesis Trading**[0-15 minutes]

* Read each other’s proofs. Evaluate for correctness and use your checklist to determine if they met the writing guidelines.

**More Practice with LaTeX** [15-30 minutes]

* Time to practice - reproduce the documents you were given

**Synthesis Presentation** [30-45 minutes]

* Section 2.2 #3 (f)-(g). Put (h) and (i) on a slide and have them practice those.
  + If you graduate from college, then you will get a job or you will go to a graduate school. NEGATION: You graduate from college and you do NOT get a job and you do NOT go to graduate school.
  + If I play tennis then I will was the car or I will do the dishes. NEGATION: I play tennis and I do not wash the car AND I do not do the dishes.
  + If you clean your room or do the dishes then you can go see a movie. NEGATION: You clean your room or do the dishes and you can not go see a movie.
  + If it is warm outside and if it does not rain, then I will play golf. NEGATION: It is warm outside and it does not rain and I do not play golf.
  + COMMENTS: (1) Try to think of an “if-then” statement as being two pieces, a “hypothesis” and a “conclusion”. The negation is “hypothesis and not conclusion”. (2) The negation is what makes the statement false. Use your intuition in combination with the rules for negating.
* Section 2.2 #11 (a)-(d). Let a, b, and c, be integers. Consider the following conditional statement: *If a divides bc then a divides b or a divides c.* Which of the following have the same meaning and which are the negations?
  + *If a divides b or a divides c, then a divides bc.* This is the **converse**, it’s not logically equivalent to the statement or the negation.
  + *If a does not divide b or a does not divide c then a does not divide bc.* This is almost like the contrapositive, but it’s not quite, so the answer is neither.
  + *a divides bc, a does not divide b, and a does not divide c.* This is the **negation**.
  + *If a does not divide b and a does not divide c then a does not divide bc.* This is the **contrapositive**. So it is logically equivalent.

**More on Logical Equivalencies** [45-55 minutes]

* Sometimes you want to rewrite a statement (LOGICAL EQUIVALENCIES FOR P-> (QV R) or (PVQ)->R. [Statements to consider: If I win the lottery then I will invest the money or I will move to Thailand. If I go on a diet or I work out then I will lose weight.] (Be careful with “do these things make sense logically?” since we don’t always use things in English the way we do in math.)

**Equivalent statements** [55-70 minutes]

* Work on page 2 of new 2.2 worksheet

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

PART 2: Sets! (40 minutes)

Why? Because we will want to prove things about sets!

**Work on Section 2.3, page 2, Activity 3 #1** [75-85 minutes]

* Read the bar as “such that”. Read the first part as “y in the integers such that”. Have them practice reading out loud to their neighbors.

**Preview Activity for last Wednesday discussion** [85-95 minutes]

* {m in M | Harrison Ford was an actor in m}
* {x in Z | x^2 -4 < 0} ={-1,0,1} vs. {x in R | x^2-4<0} = (infinite set)
* Write {1,2,3,4,…,10} in set builder notations: {x \in Z : 1<= x <= 10}
* Write {...,-9,-4,1,6,11,16,…} in set builder notation: {n \in Z : n=5k+1 for some k \in Z} vs. {5k+1 : k \in Z} **Question:** why 2 letters vs. one?
* Write {2,4,8,16,32, 64,…} in set builder notation: {n\in N: n=2^k for some k in N} vs. {2^k : k\in N}
* Comments on their preview activity: C= {3, 6, 9, 12, 15,…}
  + {x | 3x} does not mean anything, you need a universal set
  + {x in Z: 3x} this has a universal set now which is good, but two things:
    - don’t want Z, that includes negatives!
    - x such that 3x still doesn’t mean anything – you want all the x’s that are equal to a multiple of 3, need a different variable.
  + {a in N: a =3b for some b in N} is correct! OR {3k : k \in N}

**Worksheet 2.3 page 2** [95-105 minutes]

* Focus on #2 and #3

PART 3: For all and there exists (10 minutes)

* If time for this! Talk about the preview activity for last Wednesday. Difference between “every cat is grey” (universal quantifier) and “there exists a cat that is grey”

**Synthesis Activity: (some subset of the following)**

* Section 2.3 #1 (a)-(c)
* Section 2.3 #2
* Section 2.3 #3
* Section 2.3 #5

**Preview Activity:**

* Section 2.4 – negating quantified statements Code: 4VYH8E

**Quiz:**

* L1, L2, L3