Intro to Proofs Day 16 Outline (This class meets for 110 minutes.)

**Need: Proof portfolio #8 handout, graded stuff to hand back**

PART 1: Announcements and Synthesis (0-20 minutes)

**Section 5.1 #5(a)-(c)**

* (a) The set {a,b} is a subset of {a,c,d,e}. FALSE. Note that for {a,b} subset of {a,c,d,e} then if x in A then x in B. This is false since b in A, but b not in B. (Try to get them to use the negation of the definition.)
* (b) The set {-2,0,2} is equal to {x\in Z | x is even and x^2<5}. TRUE. (Note that each is a subset of the other.)
* (c) The empty set is a subset of {1}. TRUE. Every element of the empty set is in {1}. (The hypothesis is always false.)

**Section 5.1 #8 (e), (f), (g), (h) U = N**

* A = {x \in N | x\geq 7}
* B = {x in N | x is odd}
* C = {x in N | x is a multiple of 3}
* D = {x in N | x is even}
* (e): : .
  + So : {3,9,12,15,18,…}
  + Note we can only have odd multiples of 3 before 12
* (f)
  + is {9, 12,15, 18,….} “Multiples of 3 that are larger than 7”
  + is {3,9,…} “Odd multiples of 3”
* is {3,9,12,15,18….} Note this is the same as (e)
* (g) empty set!
* (h) Universal set!

PART 2: Set Theory Basics (20-40 minutes)

**Go over page 1 as a class**

**They work on page 2**

PART 3: Proofs (40-60 minutes)

**Go over Preview Activity**

*Notes:*

* Slide 3: T is not a subset of S. T = {x in Z | x = 1 (mod 4)}, S = {x in Z | x = 9 (mod 12)}
  + The converse is “T is a subset of S”
  + There exists x in U such that x is in T, but x is not in S.

**Example Proof (if necessary):** A = {x\in Z | x is a multiple of 3}, B = {x\in Z | x is a multiple of 9}. Is A a subset of B? B a subset of A? Prove using the “choose an element” method.

**Page 3**

* Set them up. What does proper subset mean? Show them how to set up.

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

PART 3: More Set Proofs (70-90)

**Page 4**

* Set up: If x is in X \cap Y then x is in X AND x is in Y. So assume or show, you need to say both. Similarly for union. If x is in X \cup Y then x is X or x is in Y, so cases if you are assuming. If you are showing x is in X \cup Y, and you figure out that x is in X, then you are done, you only need to show it’s in one or the other!
* They work on proving

**Disjointness and Cartesian products (90-110)**

* Depending on timing they work on this.