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

**Need: Skill Quizzes, 4.2 worksheet, Chapter 5 worksheet, Proof portfolio handout**

PART 1: Announcements and Synthesis (0-30 minutes)

**Reflections:**

* *Some notes: YAY FAILURE. Was a lot for you and not for me.*

**Proof by induction that for each natural number n, 1+3+5+…+(2n-1) = n^2**

* Inductive step: assume 1+3+5+…+2k-1 = k^2. Show 1+3+5 +….+2k-1 + 2(k+1)-1 = (k+1)^2.
* Add 2(k+1)-1 to both sides of assume, then
  + (k)^2 + 2(k+1)-1 = k^2+2k+2-1 = k^2+2k+1 = (k+1)^2

**Proof by induction that for each natural number n with n>= 2, 3^n>1+2^n**

* Base case: when n=2, 3^2>1+2^2
* Inductive step: assume 3^k >1+2^k. Show that 3^(k+1) > 1 + 2^(k+1). Two ways:
  + Multiple both sides of assume by 3, then
    - 3^(k+1)>3+3\*2^k >1+2^k+2^k+2^k >1+2(2^k) = 1+2^(k+1)
  + Start with left hand side: 3^(k+1)=3\*3^k>3\*(1+2^k)=3+3\*2^k…

PART 2: Induction and Recursion (30-50 minutes)

**Work on page 1 of worksheet with Fibonacci numbers.**

* Even if you know how to do induction, every induction problem will be a little bit different.

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

PART 3: Sets!!!

**Discuss Preview Activity: (60-70 minutes)**

* See Snapshots
* Point out TeX codes
* Questions on subset/proper subset

**Pages 1 and 2 (70-90 minutes)**

**Example Proof:** 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.

PART 4: 100-110 Minutes

**QUIZ**