Intro to Proofs Day 13 Outline (This class meets for 110 minutes.)

**Cards, 4.1 worksheet, summary worksheets, exams to hand back**

PART 1: Synthesis Presentation (0-25 minutes)

**Which cases should you use?**

* If no one wants to present have a class discussion

**Section 3.5 #12a -** If a is not congruent to 0 mod 7 then a^2 is not congruent to 0 mod 7

* + Cases: x (mod 7) for x equal to 1,2,3,4,5,6

**Section 3.5 #12b**

* Use contrapositive!! Notice that it’s the same as 12a

**Section 3.5 #12c**

* Proof works like sqrt{3} is not rational

**Example: sqrt{45} is not rational.**

* Suppose sqrt{45} is rational. a/b = sqrt{45} = 3sqrt{5} so a/3b = sqrt{5}. Contradiction since sqrt{5} is not rational.

PART 2: Section 3.5 Worksheet page 3 (25-40)

**Have students work in groups on the conjecture on page 3.**

* How do we know to use the contrapositive here?
* Should get 4 cases. Why?

PART 3: Induction Preview Activity! (40-50)

**Preview Activity Notes**

* **Slide 3:** 
  + 2^(2n+1) -1?? Vs. 2(2^n+1)-1 = 2^(n+1) -1
* **Slide 5:** 
  + Go over questions
* **Slide 6:**
  + Show the steps
* **Do proof that 2^0+2^1 + … 2^n = 2^(n+1)-1**

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

**Our First Proof by Induction [60-70]**

* When we’ll do it: When the statement is (Vn\in\N)(P(n)) and we think there’s a way to get to n+1 from n. The “and so on” method.
* When we’ll do it – the chicken nugget problem.
* Why it works – going up the staircase. In terms of conditional statements. Why is P(2) true? Why is P(3) true?

**Induction Workshop [70-110]**

* Just do as many induction problems as you can.
* For each problem
  + Can we do induction here?
  + What is P(n)?
  + What is the base step (P(1))?
  + Is the base step true? (Just substitute 1, be careful not to assume your conclusion)
  + What is the inductive step (P(k)-> P(k+1))?
  + Is the inductive step true? (Assume hypothesis of conditional statement show conclusion?

Synthesis: Read Proposition 4.4 on pages 178-179. #3a on page 180. No preview activity.