Intro to Proofs Day 19 Outline (This class meets for 110 minutes.)

**Need: 6.3 worksheet, notecards with words “domain, codomain, range, image, preimage” (5 sets)**

PART 1: Synthesis (0-20 minutes)

**Section 6.1 #6 The number of divisors function**

* d(1)=1, d(2)=2, d(3)=2, d(4)=3, d(5)=2, d(6)=4, d(7)=2, d(8)=4, d(9)=3, d(10)=4, d(11)=2, d(12)= 6
* Yes, d(1)=1. The only preimage of 1 would be 1, since all other numbers are divisible by 1 and themselves and these are distinct.
* Yes, in fact all prime numbers n have d(n)=2
* False. Note that 2 is not equal to 3 but d(2)=2 and d(3)=2
* (e)/(f) d(2^k) = k+1
* True. For n in N you can let m=2^(n-1) then d(2^(n-1))=(n-1)+1 = n.

PART 2: Section 6.2 on Functions (20-50 minutes)

**Work on pages 2-4 of Section 6.1/6.2 worksheet**

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

PART 3: Injective/Surjective Functions (60-110 minutes)

**Go over Preview Activity**

*Notes:*

* Write on board: An **injective function** is a function f:A -> B such that for all x, y in A if x \neq y then f(x)\neq y. A **surjective function** is a function f: A -> B such that for every y in B there exists x in A such that f(x)=y.
* **Slide 2:** Questions with snapshots
* **Slide 3:** Everyone got correct, talk about why.
* **Slide 4:** Emphasis on using definition to negate. Correct the incorrectly negated one.
* **Slide 5:** Slightly confused on what surjection is
* **Slide 6:** Show table. Why is g not an injction?
* **Slide 7:** See snapshots

**Page 1-2**

* Students work through. Ask students to write answers on board for “generate your own examples”
* Choose one of the examples to do a proof that the function is an injection (back up: ln(x)) and one to do a proof that a function is a surjection (back up: Round(a) – round up)

**Pages 3-4**

* Students work through