Last name _____

First name _____

LARSON—MATH 353–HOMEWORK WORKSHEET 09

Suggestions: Write out lots of examples. Collect evidence. Doodle. You won't sit down knowing the right idea. But it **will** come if you start early, wrestle with the problem, read, sleep on it, and come back to it.

From Stein—Chapter 2

1. (Chinese Remainder Theorem). Solve for x:

$$x \equiv 3 \mod 7$$

$$x \equiv 10 \mod 11$$

2. (Euler ϕ). Find all natural numbers n such that $\phi(n) = 1$.
3. (Euler ϕ). Do there exist natural numbers m and n such that $\phi(mn) \neq \phi(m) \cdot \phi(n)$?
4. Find all four solutions to the equation: $x^2 - 1 \equiv 0 \mod 35$.
5. In class we proved: For any integer $n > 1$, the number of distinct prime factors of n is no more than the square root of the total number of divisors of n. Write up a nice proof.