**Homework 8**

**Instructions:** Do as many of the problems as you like, but make sure to complete at least **three**. Then I will create a solution from your work.

1. Find *n* for which . (There are six such *n*'s.)
2. The order of 24 modulo 101 is 25. In other words, 2425=1 (mod 101) and no smaller power is congruent to 1. Note that 242 also has order 25. (You can assume all of this as given, no need to reprove.) Find 18 other numbers of the form 24k  (do not include *k*=1 or 2 in the count) which have order 25. (Not a trial and error question.)
3. Suppose that *p,q* are two distinct primes congruent to 1 mod 4. Show that the congruence has a solution.
4. Show that if has an element of order *d* then it has at least elements of order *d.*
5. Find the only *n* value for which the order of 3 modulo *n* equals 3.
6. Is it true that the least common multiple of all the orders modulo *n* equals If so, justify. If not, give a counterexample.