Number Theory Homework Week 9

1. Show how the matrix of numbers works out for (4)(9) in the proof that the Euler Phi-Function is multiplicative. That is show that there are $φ\left(m\right)$ columns with numbers relatively prime to 4 and in fact in such columns they all are relatively prime to 4. Also show that in those columns there are exactly $φ\left(n\right)$ numbers relatively prime with 9.
2. Find $φ(33000)$.
3. Write out the numbers relatively prime with 36, multiply them all by 5 and show they pair up modulo 36 with the original list.
4. What are the last two digits of $7^{777}?$
5. Let $n=36$. What are the divisors of 36? Let $S\_{d}$= set of positive numbers less than 36 that have a gcd of $d$ with 36. Write out $S\_{d}$ for each divisor of 36. Notice each number positive number less than 36 shows up exactly once. Calculate $φ(\frac{36}{d})$ for each $d$. Notice that shows how many elements in each set.

5 worth 8 pts, rest 5 pts