CSE 321: Discrete Structures
Autumn 2008

Assignment #3
Due: Wednesday, October 22

**Problems:**

1. Prove or disprove: $n^2 + 3n + 1$ is always prime for integer $n > 0$.
2. Prove that if $n$ is an integer then $n^2$ mod 8 is either 0, 1, or 4.
   Hint: Consider the different cases of $n$ mod 4.
3. Section 3.4, exercise 22
4. Compute the greatest common divisor for each of the following pairs of numbers.
   (a) $2^1 \cdot 3^3 \cdot 5^5$, $2^2 \cdot 3^3 \cdot 5^2$
   (b) 100!, 127
5. Use the Euclidean algortihm to find gcd(2274,174).
6. What is the rightmost digit (digit in the units place) of $32^{631}$? Show your work.
7. Prove that for any prime $p > 3$, either $p \equiv 1 \pmod 6$ or $p \equiv 5 \pmod 6$.
8. Section 3.5, exercise 32
9. Find an inverse of 2 modulo 17.
10. **Optional:** How many zeroes are there at the end of 100! ?

Please write about how many hours it took you to complete this assignment near where you write your name on the first page.