CSE 321: Discrete Structures — Assignment #3

January 22, 2007 — Due: Monday, January 29

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 [5th edition: Section 2.4, exercise 44]
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 [5th edition: Section 2.4, exercise 46]
9. Find an inverse of 2 modulo 17.
10. **Optional:** How many zeroes are there at the end of 100! ?