Math 312, Section 102 Homework #8 due Tuesday, November 13, 2001 at the beginning of class

- I. Rosen, Section 6.1, p. 203, #10 and #22
- II. If p is a prime and a and b are any integers, prove that $(a+b)^p \equiv a^p + b^p \pmod{p}$. (Hint: Fermat's little theorem.) This is sometimes called the *freshman's binomial theorem*....
- III. Rosen, Section 6.2, p. 213, #2 and #8
- IV. Prove that $2,821 = 7 \times 13 \times 31$ is a Carmichael number. Do not use Theorem 6.7; rather, use Fermat's little theorem directly.
- V. (a) Write down a reduced residue system for each of the moduli 9, 10, 11, and 12.
 - (b) Write down a reduced residue system modulo 15 that consists entirely of odd numbers.
 - (c) Write down a reduced residue system modulo 14 that consists entirely of multiples of 5.