Math 312, Section 102
Homework #3
due Tuesday, October 2, 2001 at the beginning of class

I. Find a pair of seven-digit numbers whose greatest common divisor is 8383.

II. Rosen, Section 3.2, p. 85, #22

III. For each of the following pairs of numbers a and b, compute (a, b) and find integers x and y satisfying $(a, b) = ax + by$.
(a) $a = 85$, $b = 145$
(b) $a = 984$, $b = 1231$
(c) $a = 98$, $b = 280$
(d) $a = 3456$, $b = 4563$

IV. Prove the following two assertions, using the following fact (proved in class): if a, b, and c are integers with a and c relatively prime, then $(a, bc) = (a, b)$.
(a) If $r \mid st$ and $(r, s) = 1$, show that $r \mid t$.
(b) If x is relatively prime to both y and z, show that x is relatively prime to yz.

V. If two integers are relatively prime to each other, show that their sum and their product are also relatively prime to each other. In other words, if $(a, b) = 1$, show that

$$(a + b, ab) = 1.$$