Name _____ Discrete II, Test 3, 4/21/2014

1) Determine whether or not 113 is prime in as few steps as possible. Show all your work. (10 points)

2) Find gcd$(60,90)$. (5 points)

3) Let n, c, and d be integers. Assume that $dc|nc$. Give a brief explanation to justify why $d|n$. (10 points)

4) Find $4 + 3 \bmod 5$. (5 points)

5) Find $2 \cdot 3 \bmod 5$. (5 points)

6) Find $3 - 4 \bmod 5$. (5 points)

7) Find $4 \div 3 \bmod 5$. (5 points)

8) Find $444^{333} \bmod 5$. (5 points)

9) Find 99^{-1} mod 500. (25 points)

(Don't try to rush this problem! Take your time and write out each step)

In problems 10-12, use the primes 5 and 7 to construct an RSA cryptosystem using the encryption key 11.

10) Find the modulus the communication channel should use. (5 points)

11) Find the encryption function. (Using the key 11 as specified above) (5 points)

12) Find the decryption function. (Corresponding to the encryption key 11) (10 points)

13) Briefly explain the purpose of cryptography. (5 points)