MATH 406 – HOMEWORK X

(due Friday 1 May 2009)

1. Decrypt the message HYATDRT, which was encrypted using a shift cipher sending E to T. Explain thoroughly.

2. Determine the inverse (decryption key) to the affine transformation $C \equiv 7P + 15 \pmod{26}$.

3. The two most common letters in a long ciphertext encrypted by an affine transformation $C \equiv aP + b \pmod{26}$ are X and Q respectively. What are the most likely values for a and b? Explain.

4. Determine the inverse (decryption key) to the exponentiation cipher defined by $C \equiv P^5 \pmod{29}$.

5. Find the primes p and q if $n = pq = 12,827$ and $\phi(n) = 12,600$. Explain.

NOTE: Explain your work clearly. Your solutions must include enough detail to justify your conclusions.