

Practice:

- (1) Suppose Alice is using the Affine cipher with encryption function $E(x) \equiv 23x + 9 \pmod{26}$. What is the ciphertext for the plaintext message HI?
- (2) Using the same encryption function for an affine cipher, $E(x) \equiv 23x + 9 \pmod{26}$ find the equation for the decryption function in the form $D(y) \equiv cx + d$ where c and d are numbers between 0 and 25.
- (3) Suppose you have a known plaintext situation for affine cipher. The plaintext is HAHAHA and the ciphertext is NONONO. Determine the key (i.e. the encryption function). Hint: write down some equations modulo 26 that must be true and try to solve for the key. Use the multiplication table posted on the website.
- (4) Suppose you have a known plaintext situation for an affine cipher. The plaintext is MMM and the ciphertext is QQQ. Explain why this is not enough information to determine the key.