Crypto Exam #1 Review Questions

1) Using an affine cipher with the encryption keys a = 9, b = 5, encrypt the plaintext "KNIGHTS" (rszhqul)

2) If the encryption keys for the affine cipher are a = 9 and b = 5, what are the corresponding decryption keys? (a=3, b=11)

3) Consider using the affine cipher on an alphabet of size 20. How many possible keys would there be? (160)

4) Find 36\(^{-1}\) mod 79 (11)

5) The ciphertext for a Vigenere cipher is "HZXKEP". If the encryption keyword is "CIPHER", what was the original plaintext? (Friday)

6) Encrypt "MORNINGX" using the Hill cipher with the encryption key \[
\begin{pmatrix}
5 & 9 \\
3 & 5
\end{pmatrix}
\]. (UCVMDLLD)

7) Determine the index of coincidence for the following set of letters: 10 As, 25 Bs, 25 Cs, 40 Ds. (19/66) as a fraction in lowest terms.

8) Encrypt "LASTQUESTION" using the playfair cipher and the keyword "LEMONS". (escprplaytnl)

9) Determine the corresponding decryption key for the encryption key \[
\begin{pmatrix}
2 & 9 \\
3 & 5
\end{pmatrix}
\] in the Hill Cipher. Assume an alphabet size of 26. \[
\begin{pmatrix}
15 & 25 \\
17 & 6
\end{pmatrix}
\]
1) Using an affine cipher with the encryption keys $a = 9$, $b = 5$, encrypt the plaintext "KNIGHTS".

Answer: ________________________

2) If the encryption keys for the affine cipher are $a = 9$ and $b = 5$, what are the corresponding decryption keys?

Answer: ________________________

3) Consider using the affine cipher on an alphabet of size 20. How many possible keys would there be?

Answer: ________________________
4) Find $36^{-1}$ mod 79.

Answer: ________________________

5) The ciphertext for a Vigenere cipher is "HZXKEP". If the encryption keyword is "CIPHER", what was the original plaintext?

Answer: ________________________

6) Encrypt "MORNINGX" using the Hill cipher with the encryption key $\begin{pmatrix} 2 & 9 \\ 3 & 5 \end{pmatrix}$.

Answer: ________________________
7) Determine the index of coincidence for the following set of letters:

10 As, 25 Bs, 25 Cs, 40 Ds.

*as a fraction in lowest terms.*

Answer: ________________________

8) Encrypt "LASTQUESTION" using the playfair cipher and the keyword "LEMONS".

Answer: ________________________

9) Determine the corresponding decryption key for the encryption key $\begin{pmatrix} 2 & 9 \\ 3 & 5 \end{pmatrix}$ in the Hill Cipher. Assume an alphabet size of 26.

Answer: ________________________