

CIS 3362 Quiz #2: Playfair, Hill, ADFGVX, Transposition, Enigma, Navajo Code

Date: 9/19/2025

Name : _____

1) (10 pts) Encrypt the plaintext "CUTTINGTHEGRASSNOW" using the Playfair cipher with the following key: "LAWNMOWER". Please use the padding character 'X'. What is the ciphertext? Please carefully fill in the empty Playfair square given below.

2) (5 pts) Answer these questions about the Enigma, as told in class (and in the course notes).

(a) (1 pt) From what country is the mathematician who initially broke the Enigma in the mid 1930s?

(b) (1 pt) A spy from which country initially obtained the Enigma blueprint from Hans Thilo Schmidt?

(c) (3 pts) Initially, the Enigma machine had 3 scramblers, which could be placed in the machine in 6 possible orders. In 1939, the Germans added 2 scramblers, meaning that the number of possible orderings of the scramblers multiplied by 10, to 60. Let's suppose that the Germans then added 5 more scramblers, keeping the number of slots to place scramblers at 3. By what multiplicative factor would this have increased the number of possible orderings for the scramblers compared to the 1939 arrangement?

3) (15 pts) The ciphertext "CYPZXRJX" was produced via the Hill cipher using the **encryption key** $\begin{pmatrix} 3 & 9 \\ 2 & 7 \end{pmatrix}$. What is the corresponding decryption key? What is the matching plaintext? (Note: To speed up computation, reduce values under mod appropriately, so use negatives as needed.)

Decryption Key = _____

Plaintext = _____

4) (10 pts) The ciphertext below (of 54 characters) was encrypted via column transposition with the keyword "KLEENEX". Decrypt the message to recover the plaintext. Feel free to use the grid provided as you see fit. (Partial credit will be given if we can make sense of what you did with the grid but don't get the correct answer.)

ABIOINHLVE
GUHTTDCTET
VREIIETIRU
IHMHMNUOEE
DHNAHHSLS
AEOF

5) (9 pts) Answer the following questions based on the lecture notes and in class lecture about the Navajo Code in World War II.

(a) (4 pts) What are the two main criteria that were used when searching for a Native American language to use as the basis for a secret code the United States was going to use during World War II?

1. _____

2. _____

(b) (2 pts) For each English letter, one or more Navajo words were assigned to that letter. In what situations were these words used in relaying an encoded message?

(c) (3 pts) As mentioned above, not each of the English letters had the same number of assigned Navajo words to it, why did some letters have more words assigned than others?

6) (1 pt) Which Native American group previously lived in the same location (and many surrounding areas) as the current day Sioux City?
