

CIS 3362 Final Exam - Part A (Classical Cryptography) - 25 pts

Date: 12/9/2020

Start Time: 10:00 am EST

End Time: 10:35 am EST

You may use your class notes, reference sheets and calculator. Please still show each step but just put answers of calculations you made in your calculator.

Note: Please put your name in the document you turn in.

- 1) (5 pts) How many possible keys are there for an affine cipher for an alphabet of size 60?
- 2) (10 pts) In a set of 100 bits (zeroes and ones), the index of coincidence is $\frac{19}{33}$. Let x be the number of 0s in the set and y be the number of 1s in the set. What is $|x - y|$?
- 3) (10 pts) You are trying to find the encryption key for a Hill cipher with block size two for a regular alphabet size of 26 and know that the plaintext "TRIP" maps to the ciphertext "TJMP". Use this information to determine the **encryption** key. Note: The encryption key is a matrix of the form $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$, where $0 \leq a, b, c, d \leq 25$. **(Note: if you correctly solve for the decryption key, you will earn only 5 out of 10 points, even though the work for doing so is equally hard as finding the encryption key.)**