Week 5 Friday

Make sure you're sitting next to people!

Ideas

Introduce yourself to your neighbor(s) if needed. Then discuss:

We're about half way through the quarter! What do you think are some of the most interesting and/or important ideas we've encountered in the class so far? Brainstorm a few things with your neighbors!

Reminder

Check quiz webpage for instructions about quiz 4!

Breaking rectangular transposition, continued

1. Suppose that, when trying to codebreak some ciphertext that was encrypted using rectangular transposition, you find a "G box" that looks as follows, where ! indicates an entry that is much smaller than every other entry on the same row:

$$
\begin{bmatrix}
. & . & ! & . & . \\
. & . & . & ! & . \\
. & ! & . & . & . \\
. & . & . & . & . \\
! & . & . & . & .
\end{bmatrix}
$$

Use the decrypting permutation suggested by this "G box" to decrypt the ciphertext ATRHE.

2. Some time ago, you intercepted some ciphertext that was encrypted using rectangular transposition. In your notebook, you wrote down that the "G box" for the correct period looked something like this:

$$\begin{bmatrix} \infty & 1918.5 & 2013.8 & 2068.5 & 433.2 \\ 2068.7 & \infty & 1711.6 & 485.2 & 1961.2 \\ 1884.4 & 1914.7 & \infty & 2035.6 & 2186.3 \\ 505.9 & 2243.6 & 1997.7 & \infty & 2163.7 \\ \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare \end{bmatrix}$$

You inadvertently smudged the ink on the last line and can't read it anymore, but you've just intercepted a new ciphertext that you know was encrypted using the same key as the last one. The new ciphertext reads ACMHSDOOFOYMEQE. What is the plaintext?

Conditional Probability, Independence

3. In an imaginary country, 80% of the population is monolingual, 50% of the population likes hiking, and 40% of the population both is monolingual and likes hiking. If a resident of this country is chosen at random, is the event that this person is monolingual independent of the event that this person likes hiking?

(A) Yes

(B) No

4. Roughly 1% of people are allergic to cats. Allie thinks she might be too, so she takes an allergy test which has a 20% false negative rate and a 10% false positive rate. The test results come back saying that Allie is allergic to cats. What is the probability that Allie is *actually* allergic to cats?

(A) More than 75%

(B) Between 50% and 75%

(C) Between 25% and 50%

(D) Less than 25%