

Cryptology

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1 Problem 1

DWWDFN DW GDZQ

2 Problem 2

I CAME I SAW I CONQUERED

3 Problem 3

IEXXKFZKX CUUKZCSTKJW

4 Problem 4

READMYLIPS

5 Problem 5

k=12

6 Problem 6

k=8

AN IDEA IS LIKE A CHILD NONE IS BETTER THAN YOUR OWN FROM CHINESE FORTUNE COOKIE

7 Problem 7

To find a and b, we need a system of equations rather than a single equation, in order to cancel out the variables.

If our affine transformation's equation looks like $aP + b\%26 = C$ (I use the percent for the modulo

operator, as it is convention in coding languages), then we can replace P and C with our plaintext and our cipher, respectively, in order to result in two equations with only numbers and the variables a and b .

For this problem specifically, we can write this as $aE + b\%26 = W$ and $aT + b\%26 = B$, or more accessibly by using an alphabetic adaptation of ASCII (0-25), $(4a+b)\%26 = 22$ and $(19a+b)\%26 = 1$.

Then, if we solve this system of equations we get 9 for a , and 12 for b .

8 Problem 8

Here, we do the same thing, but with a different system of equations for this problem. However, we do not know which B (6), T (6), N (6), Z (5) that A maps to, since all we are told is that A is one of the most common letters.

But since we define A as having a numerical value of 0, any instances with A in the systems of equations will cancel out the a in $aP + b = C$. So we can rule out our possible systems of equations with four instances of b , where $b\%26 = 1, b\%26 = 19, b\%26 = 13, b\%26 = 25$.

Then, since we have the four most common letters, there are 3 other possibilities between the cyphertext and the plaintext, so in total we get 12 combinations (4 possible b 's, 3 possible a 's for each of those b 's).

Using this, all you have to do is simply check each of these and see which looks like English.

$a = 21$ and $b = 13$

The plaintext is THIS MESSAGE WAS ENCIPHERED USING AN AFFINE TRANSFORMATION.

9 Problem 9

$$17(5P + 13) + 3 = 85P + 221 + 3 = 85P + 224$$