

Homework 1, Due Tue July 9, 2013

1. (10 points) What is your name? Write it clearly. Staple your HW. What High School are you from? If you have never gotten an email from me then email me.
2. (10 point AND this will help you with the next two problems) Assume Alice and Bob use a shift cipher with shift 10. Write down the correspondence table for both encoding and decoding.
3. (10 points) Assume Alice and Bob are using shift cipher with shift 10. If Alice wants to send *Computer Science is a Great Major* what does she send (remember that she before coding she breaks the message into blocks of five and only uses small letters).
4. (10 points) Assume Alice and Bob are using shift cipher with shift 10. If Alice receives the message *WKDRO WKDSM CRKCX YVSW DC* then what did Bob send?
5. (10 points and this will help you with the next two problems) Assume Alice and Bob use an affine cipher with multiplier 3 and additive term 1. Write down the correspondence table for both encoding and decoding.
6. (10 points) Assume Alice and Bob are using an affine cipher with multiplier 3 and additive term 1. If Alice wants to send *Computer Science is a Great Major* what does she send (remember that she before coding she breaks the message into blocks of five and only uses small letters).
7. (10 points) Assume Alice and Bob are using an affine cipher with multiplier 3 and additive term 1. If Alice receives the message *BXDND LFDZF LFRJB FBBDJ HDBJT RNPDP FDHJ* then what did Bob send (remember that before coding he breaks the message into blocks of five and only uses small letters).
8. (10 points) For this problem we are operationg mod 13.
 - (a) For each number in $x \in \{0, 1, 2, \dots, 12\}$ find $-x$, that is find a number y such that $x + y \equiv 0 \pmod{13}$.
 - (b) For each number in $x \in \{1, 2, \dots, 12\}$ find $1/x$, that is find a number y such that $xy \equiv 1 \pmod{13}$.

9. (20 points) In Fredonia they have 15 letters in their alphabet. They want to use an affine cipher, that is, we want to code the number $x \in \{0, 1, \dots, 15\}$ by the number $ax + b \pmod{32} \in \{0, 1, \dots, 31\}$. List all the numbers that CAN be used for a .
10. (0 points. If you know programming than do for fun.) Write a program that will, given a text and a number s , produce the output of the Shift Cipher when shifted by s . Also write a program that will, given an s and given a message that was coded by a shift cipher with shift s , decodes it. Test both of them with each other.