Name:_____

Introduction to Cryptography
Homework 1

Answer the following questions.

(1) Determine which of the following statements are true and which are false.
   (a) $144 \equiv 34 \mod 10$
   (b) $99 \equiv -1 \mod 8$
   (c) $144 \equiv 12 \mod 7$
   (d) $20 \equiv -20 \mod 40$

(2) Write out several integers x satisfying $x \equiv 1 \mod 2$. What type of integers satisfy this equation?

(3) Determine whether the following statements are true or false. If a statement is true, explain why. If it is false, give a counterexample.
   (a) All numbers that are divisible by 5 are also divisible by 10.
   (b) All number that are divisible by 10 are also divisible by 5.
   (c) The remainder whenever an integer x is divided by 5 is the same as the remainder whenever x is divided by 10.

(4) Encrypt the following message by shifting each letter in the alphabet by 13 to the right. Message: I LOVE MATH.

(5) Suppose the following encrypted message was obtained by shifting each letter of the original message by 5 to the right. What is the original message? Encrypted message: DTZ SJAJW PSTB BMJS DTZ SJJI XJHWJHD.