Trevor Blasko **Homework 3** **Due 09-19-2014**

1. Find q, r with $0 \leq r < a$, so that $b = a \cdot q + r$ with:
   (a) $a = 657232, b = 1925238$
   (b) $a = 338643, b = -3302041$.
   (c) $a = 250117, b = 182691$.

2. Compute the following:
   (a) 1299 % 9621
   (b) 617970913 % 378

3. Without a calculator find the last digit of: $9747 \cdot 28544 + 8999 \cdot 76140 + 3220 \cdot 88276$.

4. (a) Without a calculator determine the remainder of 169108559063 when it is divided by 9.
   (b) Is 169108559063 divisible by 9?

5. Encipher the message "tube" using an affine cipher with key $a = 3$ and $b = 9$.

6. (Wait until Wednesday to try this problem.) Find the inverse of 5 (mod 19) (that is, find c such that $5c \equiv 1 \pmod{19}$).

Do one of the following two problems, you can do both for extra credit.

7. Prove that if $a \equiv b \pmod{m}$ and c is an integer then $a + c \equiv b + c \pmod{m}$. You will use both the definition of mod and divisablitly.

8. Prove that if $d|a$ and $d|b$ then $d|a + b$ and $d|a - b$.

9. Find the following places on campus and take a picture of yourself there and send it to me.
   (a) The Math Learning Center
   (b) The Logic Center
   (c) The Writing Center