Taylor Thane **Homework 3** **Due 09-20-2013**

1. Find q, r with $0 \leq r < a$, so that $b = a \cdot q + r$ with:
   (a) $a = 397492, b = 1465246$
   (b) $a = 622412, b = -850247.$
   (c) $a = 604412, b = 595298.$
2. Compute the following:
   (a) 94833 % 5664
   (b) 649211393 % 236904
3. Without a calculator find the last digit of: $1495 \cdot 77786 + 5555 \cdot 48351 + 9387 \cdot 97001$.
4. (a) Without a calculator determine the remainder of 79147106464 when it is divided by 9.
   (b) Is 79147106464 divisible by 9?
5. Encipher the message "Broncos" using an affine cipher with key $a = 19$ and $b = 21$.
6. (Wait until Wednesday to try this problem.) Find the inverse of 13 (mod 29) (that is, find c such that $13c \equiv 1 \pmod{29}$).

   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