

1. Find q, r with $0 \leq r < a$, so that $b = a \cdot q + r$ with:
 - (a) $a = 89823, b = 642754$
 - (b) $a = 491592, b = -2485157$.
 - (c) $a = 384460, b = 373475$.
 2. Compute the following:
 - (a) $48661 \% 1385$
 - (b) $380660900 \% 611855$
 3. Without a calculator find the last digit of: $716 \cdot 16813 + 8843 \cdot 45441 + 1173 \cdot 43483$.
 4.
 - (a) Without a calculator determine the remainder of 437873074683 when it is divided by 9.
 - (b) Is 437873074683 divisible by 9?
 5. Encipher the message "Broncos" using an affine cipher with key $a = 7$ and $b = 18$.
 6. (Wait until Wednesday to try this problem.) Find the inverse of 6 (mod 37) (that is, find c such that $6c \equiv 1 \pmod{37}$).
- 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 divisibility.
 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