

1. Find q, r with $0 \leq r < a$, so that $b = a \cdot q + r$ with:
 - (a) $a = 38996, b = 1701003$
 - (b) $a = 207750, b = -841890$.
 - (c) $a = 23752, b = 9024$.
 2. Compute the following:
 - (a) $2097 \% 4732$
 - (b) $404071555 \% 177793$
 3. Without a calculator find the last digit of: $9389 \cdot 78932 + 8533 \cdot 60029 + 8954 \cdot 39206$.
 4.
 - (a) Without a calculator determine the remainder of 692501395403 when it is divided by 9.
 - (b) Is 692501395403 divisible by 9?
 5. Encipher the message "Broncos" using an affine cipher with key $a = 11$ and $b = 12$.
 6. (Wait until Wednesday to try this problem.) Find the inverse of $12 \pmod{31}$ (that is, find c such that $12c \equiv 1 \pmod{31}$).
- 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