

1. Find q, r with $0 \leq r < a$, so that $b = a \cdot q + r$ with:
 - (a) $a = 58086, b = 2531349$
 - (b) $a = 119017, b = -621807$.
 - (c) $a = 460187, b = 213763$.
 2. Compute the following:
 - (a) $15572 \% 331$
 - (b) $286132269 \% 206783$
 3. Without a calculator find the last digit of: $4232 \cdot 69589 + 6841 \cdot 94413 + 8719 \cdot 66472$.
 4. (a) Without a calculator determine the remainder of 388532542152 when it is divided by 9.
(b) Is 388532542152 divisible by 9?
 5. Encipher the message "Broncos" using an affine cipher with key $a = 5$ and $b = 24$.
 6. (Wait until Wednesday to try this problem.) Find the inverse of 10 (mod 19) (that is, find c such that $10c \equiv 1 \pmod{19}$).
- 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 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