

1. Suppose  $d = \gcd(47030, 21440)$ .
  - (a) Find  $d$
  - (b) Find  $k, l$  such that  $d = 47030 \cdot k + 21440 \cdot l$ .
2. For each of the following find  $a^{-1} \pmod{m}$  or explain why no such inverse exists. That is, find  $c$  such that  $ac \equiv 1 \pmod{m}$ .
  - (a)  $a = 95988, m = 1269997$
  - (b)  $a = 239847, m = 60109$ .
3. Decipher the message:  
  
QVEL VOEH FEHL U  
  
knowing it was encoded with an affine cipher with key  $a = 5$  and  $b = 4$ .
4. (Wait until Wednesday) Break the message:  
  
HWDO RDEN FQDD XJ  
  
knowing it was encoded with an affine cipher and contains the word(s) "books".
5. (Wait until Wednesday) Find  $\phi(495000)$
6.
  - (a) Get a picture of you with Natural World RA, PA (other than JuliAnne) or professor (other than me).
  - (b) Get a picture of a place to buy food on campus that you have never bought food at.