Matthew Pauling **Homework 4** **Due 09-27-2013**

1. Suppose $d = \gcd(75540, 53940)$.
   (a) Find d
   (b) Find k, l such that $d = 75540 \cdot k + 53940 \cdot l$.

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) $a = 236183, m = 483097$
   (b) $a = 342893, m = 636804$.

3. Decpipher the message:

   ```
   JUBO IBBQ CW
   ```

   knowing it was encoded with an affine cipher with key $a = 21$ and $b = 8$.

4. (Wait until Wednesday) Break the message:

   ```
   HODX ODDI IXGQ BIRR IVSQ HH
   ```

   knowing it was encoded with an affine cipher and contains the word(s) "a mall".

5. (Wait until Wednesday) Find $\phi(1128600)$

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.