Name: _____

Please show all work.

1. Find all integer solutions $[x, y]$ to the linear Diophantine equation $15x - 24y = 9$

2. Find the general simultaneous solution to the system of linear modular equations

   $7x \equiv 3 \bmod 11$

   $5x \equiv 2 \bmod 13$

3. Let x_n be the sequence of integers recursively defined by

   $x_0 = 0$

   $x_1 = -3$

   $x_n = 5x_{n-1} - 4x_{n-2}$ for $n > 1$

   Prove by induction on n that $x_n = 1 - 4^n$ for all $n \geq 0$

1	2	3	total (30)