Name: **Tutorial time:**

Problem you want feedback on:

Please complete all problems below.

1. Let $A = \begin{bmatrix} 1 & -2 & 3 \\ 0 & 4 & -2 \end{bmatrix}$, $B = \begin{bmatrix} 3 & 5 \\ -1 & 2 \\ 0 & -2 \end{bmatrix}$, and $C = \begin{bmatrix} 2 & -4 \\ -3 & 6 \end{bmatrix}$.

   Compute each of the following, or explain why they're not defined:

   (a) $2A - 3B^T$. (B^T denotes the transpose of B. Ask if you don't know what that is.)

   (b) $2A - 3C$.

   (c) AB

(d) BA

(e) $AB + C$

(f) $BA + C$

2. Compute the inverses of the following matrices, if possible:

   (a) $A = \begin{bmatrix} 1 & 3 \\ -4 & -2 \end{bmatrix}$

   (b) $B = \begin{bmatrix} 1 & 0 & 4 \\ 0 & -3 & 2 \\ 2 & 0 & 9 \end{bmatrix}$

3. Solve the following systems. (Hint: use your answer from 2(a))

   (a)

$$\begin{array}{rcrcr} x & + & 3y & = & 3 \\ -4x & - & 2y & = & -7 \end{array}$$

   (b)

$$\begin{array}{rcrcr} x & + & 3y & = & 2a \\ -4x & - & 2y & = & -3b \end{array}$$

Possibly useful note: the question "Can the vector V be written as a linear combination of the vectors A, B, C?" is equivalent to the question "Do there exist scalars x, y, z such that $xA + yB + zC = V$?" This latter question can be turned into a system of equations in the variables x, y, z.

Similarly, the question "Given the vectors A, B, C, D, can any one of these vectors be written as a linear combination of the others?" is equivalent to the question, "Do there exist scalars w, x, y, z, *not all equal to zero*, such that $wA + xB + yC + zD = 0$?" (See if you can figure out why these two questions are the same.) This latter question can be turned into a homogeneous system of equations, and the answer is "yes" if this system has a non-trivial solution.