Answer the questions below. You may answer in the space provided. You may use a separate sheet of paper if you need more space. You are to work in groups of no more than four people. Make sure to enter the names of your groupmates below.

Name: ______________________________
Section: ______________________________

Group Members: ______________________________

1. For this problem, you will find the points of intersection for two planes in $\mathbb{R}^3$. Consider the planes given by the equations

$$4x + y + z = 0$$
$$2x - y + 3z = 2$$

   (a) (2 points) Write the augmented matrix for the system of linear equations you need to solve.

   (b) (2 points) Using elementary row operations, find a row-equivalent matrix for the matrix in part (a) that is in row echelon form.

   (c) (1 point) What are the points on both planes?

2. (2 points) Using the properties of matrix multiplication, show that for square matrices of the same size A and B, $AB = BA$ if and only if $(A-B)(A+B) = A^2-B^2$ (remember, in general, matrix multiplication is not commutative).

3. (3 points) The trace of a square, $n \times n$ matrix A is defined as the sum of the entries on the main diagonal, that is

$$\mathrm{tr}(A) := \sum_{i=1}^{n} a_{ii}.$$

Prove that for $n \times n$ matrices A and B, $\mathrm{tr}(A + B) = \mathrm{tr}(A) + \mathrm{tr}(B)$.