

**EXPLAIN YOUR ANSWERS**

**Group Members:** \_\_\_\_\_

**Goal: To understand the connections between reduced row echelon form of a coefficient matrix and the solutions of the corresponding linear system.**

Consider the following lines in  $\mathbb{R}^2$ :  $ax + by = e$  and  $cx + dy = f$ , where  $a, b, c, d, e$  and  $f$  are all real numbers such that there are two lines (even if those lines appear on top of each other).

**(a) (2 points).** Write down the augmented coefficient matrix of the linear system which represents the point of intersection of the lines.

**(b) (4 points).** Considering the coefficient matrix, what are *all* the possible  $2 \times 2$  matrices in reduced row echelon form that can result?

**(c) (2 points).** Write down examples of actual lines which would result in the rref matrices you found in (b) by choosing your own values for  $a, b, c, d, e$  and  $f$ .

**(d) (2 points).** For the three possible scenarios of lines intersecting in  $\mathbb{R}^2$  indicate which matrices you wrote down in (b) and (c) correspond to which geometric scenario and how many solutions the corresponding linear system has.