

Show all work.

1. **(12 points)** Work through the following process for the following system of equations:

$$\begin{cases} x_1 + 3x_2 + x_3 + x_4 = 3 \\ 2x_1 - 2x_2 - 6x_3 + 2x_4 = 2 \\ x_1 + 2x_2 + x_4 = 9 \end{cases}$$

- (a) **(1 point)** Write an augmented matrix for this system.
- (b) **(8 point)** Convert the augmented matrix above to reduced row-echelon form.
- (c) **(3 point)** Indicate whether the system is inconsistent, has a unique solution, or has multiple solutions. If the system is consistent, identify its solution or solutions.
2. **(8 points)** For the two matrices given below, either calculate each of the following expressions, or briefly explain why it cannot be calculated.

$$A = \begin{bmatrix} 5 & 2 & 0 \\ -3 & 1 & 1 \end{bmatrix} \quad B = \begin{bmatrix} -4 & -1 \\ 0 & 3 \end{bmatrix}$$

- (a) **(1 points)** $A - B$.
- (b) **(1 points)** $4B$.
- (c) **(2 points)** A^T .
- (d) **(2 points)** AB .
- (e) **(2 points)** BA .