

Instructions: Clearly answer each of the questions below. Remember to check the back side. Show your work and any formulas you employ. Simplify all answers as far as possible.

- (1 pt) In standard form, the right-hand side of a homogeneous linear system is the zero vector.
- (1 pt) The solution set of a homogeneous linear system is never empty.
- Suppose we have a linear system $A\mathbf{x} = \mathbf{b}$ presented below in **augmented** matrix notation.

$$\begin{bmatrix} 1 & 0 & 8 & 9 & 0 \\ 0 & 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

- (1 pt) What is the $\dim(\mathbf{x})$? 4
- (1 pt) What is the $\text{rank}(A)$? 2
- (1 pt) What is the dimension of the solution set of our linear system? $4 - 2 = 2$
- (3 pts) Give the solution in parametric vector form.

$$x_3 \begin{bmatrix} -8 \\ -1 \\ 1 \\ 0 \end{bmatrix} + x_4 \begin{bmatrix} -9 \\ -1 \\ 0 \\ 1 \end{bmatrix}$$