Instructions: This is a take-home quiz. Your solutions are due at the beginning of class on Tuesday September 22. You must show all of your work to receive full credit.

(1) Consider the matrix

\[ A = \begin{pmatrix} 0 & 0 & 0 \\ 2 & 4 & 8 \\ 1 & 2 & 4 \end{pmatrix}. \]

(a) Find the solution set of the equation \( Ax = b \) for \( b = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix} \). Express your answer as the span as a set of vectors.

(b) Find the solution set of the equation \( Ax = b \) for \( b = \begin{pmatrix} 0 \\ 2 \\ 1 \end{pmatrix} \).

(2) Determine the following set of vectors is linearly independent:

\[ \{v_1, v_2, v_3\} = \left\{ \begin{pmatrix} 0 \\ 1 \\ 2 \\ 3 \end{pmatrix}, \begin{pmatrix} 1 \\ 1 \\ 1 \\ 1 \end{pmatrix}, \begin{pmatrix} 3 \\ 2 \\ 1 \\ 1 \end{pmatrix} \right\}. \]

(3) Compute \( A^3 \) for the matrix \( A = \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix} \).