Linear Algebra
Quiz 7

Name:______________________________

You have 10 minutes to complete this quiz. If you have a question raise your hand and remain seated. In order to receive full credit your answer must be **complete**, **legible** and **correct**. Show your work, and give adequate explanations.

1. Write down the matrix that represents the reflection in $\mathbb{R}^2$ through the line $y = 1$ in homogeneous coordinates.

$$\left[\begin{array}{rr|r} 1 & 0 & 0 \\ 0 & -1 & 2 \\ \hline 0 & 0 & 1 \end{array}\right]$$

2. Find a subset of

$$S = \left\{ \begin{bmatrix} 1 \\ 1 \\ 2 \\ 2 \end{bmatrix}, \begin{bmatrix} 2 \\ 1 \\ 1 \\ 2 \end{bmatrix}, \begin{bmatrix} 2 \\ 2 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 2 \\ 2 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix} \right\}$$

that is a basis for the subspace of $\mathbb{R}^4$ spanned by S.

Equivalently, find a basis for the column space of $\begin{bmatrix} 1 & 2 & 2 & 1 & 1 \\ 1 & 1 & 2 & 2 & 1 \\ 2 & 1 & 1 & 2 & 1 \\ 2 & 2 & 1 & 1 & 1 \end{bmatrix}$. Gaussian elimination applies to show that the set consisting of the first three columns is a basis for $\mathrm{Col}(A)$, hence the first three vectors of S is a basis for the space spanned by S.