Linear Algebra, Spring 2016
Quiz 6

Name: 001 Solutions

You must show all your work to receive credit. Calculators are allowed.

Problem 1: (3 points) Let $S \subset \mathbb{R}^5$ be the set of vectors

$$S = \left\{ \begin{bmatrix} 1 \\ -2 \\ 3 \\ 4 \\ 5 \end{bmatrix}, \begin{bmatrix} 2 \\ -4 \\ -4 \\ 0 \\ 2 \end{bmatrix}, \begin{bmatrix} 2 \\ -4 \\ 1 \\ 4 \\ 6 \end{bmatrix}, \begin{bmatrix} 1 \\ -2 \\ -2 \\ 0 \\ 1 \end{bmatrix} \right\}.$$

Find a basis for the vector space $W = \text{span}S$. What is the dimension of W?

$$\text{rref}(S) = \begin{bmatrix} \textcircled{1} & 0 & 1 & 0 \\ 0 & \textcircled{1} & .5 & -.5 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

$\Rightarrow$ 1st, 2nd vectors of S give a basis

So $\begin{bmatrix} 1 \\ -2 \\ 3 \\ 4 \\ 5 \end{bmatrix}, \begin{bmatrix} 2 \\ -4 \\ -4 \\ 0 \\ 2 \end{bmatrix}$ is a basis for W

and $\dim W = 2$