

Name \_\_\_\_\_ Linear Algebra, Quiz 6

Let  $B_1 = \left\{ \begin{bmatrix} 1 \\ -1 \end{bmatrix}, \begin{bmatrix} 7 \\ 0 \end{bmatrix} \right\}$  and  $B_2 = \left\{ \begin{bmatrix} -2 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ -2 \end{bmatrix} \right\}$ .

1) Consider the vector  $\vec{x} \in \mathbb{R}^2$ . In terms of basis  $B_1$  we know  $\vec{x}_{B_1} = \begin{bmatrix} 1 \\ 2 \end{bmatrix}_{B_1}$ . What is  $\vec{x}_{B_2}$ , that is,  $\vec{x}$  in terms of  $B_2$ ? *No need to simplify your answer.*

2) Let  $V$  be the solution set to a certain system of homogenous linear equations with 7 variables. It is known that the dimension of  $V$  is 3. Associated to  $V$  is a linear operator mapping  $\mathbb{R}^7$  to  $\mathbb{R}^9$ . This linear operator obtains as its output the right hand side of the system, regardless of whether it is zero or not. What is the dimension of the range of this linear operator? *Be sure to justify your answer.*