

Math 205 Section B  
Test 3 (50 points)

Name: Solutions

- Check that you have 6 questions on two pages.
- Show all your work to receive full credit for a problem.

1. (9 points) Let  $A = \begin{bmatrix} -1 & 3 & -2 \\ 0 & 2 & 2 \end{bmatrix}$ . Use this matrix to answer the following questions:

(a) Find a basis for Col A.

$$A \sim \begin{bmatrix} 1 & 0 & 5 \\ 0 & 1 & 1 \end{bmatrix}$$

The first two columns are the pivot columns.

So a basis for Col A =  $\left\{ \begin{bmatrix} -1 \\ 0 \end{bmatrix}, \begin{bmatrix} 3 \\ 2 \end{bmatrix} \right\}$ .

(b) Col A is a subspace of  $\mathbb{R}^2$ . Is it possible to find a vector in  $\mathbb{R}^2$  that is **not** in Col A? Explain.

As seen in part (a),  $\dim \text{Col } A = 2$ .  
Since Col A is a subspace of  $\mathbb{R}^2$  of dimension 2,  
and  $\dim \mathbb{R}^2 = 2$ ,  $\text{Col } A = \mathbb{R}^2$ .  
So it is not possible to find a vector in  $\mathbb{R}^2$  that  
is not in Col A.