

# Quiz 2

## Math 341

Name:

True/False: If the statement is true, give a brief explanation of why it is. If the statement is false, give a counterexample. Let  $A$  and  $B$  be matrices, and  $c$  be a scalar.

1. [3] If a linear system is inconsistent, then the rank of the augmented matrix exceeds the number of unknowns.
2. [3] If  $cA = 0$ , then either  $c = 0$  or  $A = 0$ .
3. [3] If  $AB = 0$  then  $A = 0$  or  $B = 0$ .
4. [3] If both  $AB$  and  $BA$  are defined then  $AB = BA$ .

Free Response: Show all your work and justify your steps. No credit is given for the correct answer with no justification.

5. [4] Write  $\vec{w}$  as a linear combination of  $\vec{u}$  and  $\vec{v}$  where

$$\vec{u} = \begin{bmatrix} -1 \\ 2 \end{bmatrix}, \vec{v} = \begin{bmatrix} 1 \\ 0 \end{bmatrix}, \text{ and } \vec{w} = \begin{bmatrix} 1 \\ -1 \end{bmatrix}.$$

6. [4] Let  $A = \begin{bmatrix} 1 & -2 \\ 2 & 1 \end{bmatrix}$ ,  $B = \begin{bmatrix} 1 & 2 \\ -2 & 1 \end{bmatrix}$ , and  $X = \begin{bmatrix} x_1 & 0 \\ 0 & x_2 \end{bmatrix}$ . Given that  $AB - 5X = 0$ , find  $X$ .