MATH 2090: Linear Algebra 2 **Dr. S. Cooper, Fall 2018**

Dictionary Quiz 3 (B02 & B03)
Sample Solutions

Name and Student Number: _____

In the space provided, please write your solutions to the following exercises. *Fully explain your work*. Remember to use good notation and full sentences. For full credit you must also demonstrate serious effort on the Tutorial Worksheet.

Good Luck!

1. Let A be an $m \times n$ matrix with entries in the field $\mathbb{F}$.

   (a) Complete the following definition: [2 pts]

   The *column space* of A, denoted $Col(A)$, is

   Solution: the span of the columns of A.

   (b) Give an example of a matrix A whose column space has dimension 3. For full credit, your answer must *briefly* justify that $\dim(Col(A)) = 3$. [Note: You do not need to find a basis for the column space to justify your answer.] [2 pts]

   Solution: Let
   $$A = \begin{bmatrix} 1 & 2 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 3 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}.$$
   The matrix A is already in reduced row echelon form and so we can see immediately that A has 3 pivot columns. Since the number of pivot columns determines the dimension of the column space of A, we must have that $\dim(Col(A)) = 3$.

2. You have demonstrated serious effort on the Tutorial Worksheet. [1 pt]