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

Dictionary Quiz 4 (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 $T : V \to V$ be a linear transformation.

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

   A scalar $\lambda \in \mathbb{F}$ is called an *eigenvalue* of T if

   Solution: there exists a *non-zero* vector $\mathbf{x} \in V$ such that $T(\mathbf{x}) = \lambda\mathbf{x}$.

   (b) Give an example of a linear transformation which has eigenvalue $\lambda = -1$. For full credit, your answer must verify that $\lambda = -1$ is indeed an eigenvalue.   [2 pts]

   Solution: Let $T : \mathbb{R}^3 \to \mathbb{R}^3$ be given by

   $$T((a, b, c)) = (a, 2b, -c).$$

   Then $\lambda = -1$ is an eigenvalue of T since

   $$T((0, 0, 1)) = (0, 0, -1) = -1(0, 0, 1).$$

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