

Dictionary Quiz 4 (B01)
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 $T : V \rightarrow V$ 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 $\lambda = 2$. For full credit, your answer must verify that $\lambda = 2$ is indeed an eigenvalue. [2 pts]

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

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

Then $\lambda = 2$ is an eigenvalue of T since

$$T((0, 1, 0)) = (0, 2, 0) = 2(0, 1, 0).$$

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