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

Dictionary Quiz 1 (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 V be a set and fix the field $\mathbb{F}$ (for us, $\mathbb{F} = \mathbb{R}$ or $\mathbb{F} = \mathbb{C}$).

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

   A *scalar multiplication* operation on V is

   Solution: a function that assigns an element $\lambda\mathbf{x}$ in V to each scalar λ in $\mathbb{F}$ and each element $\mathbf{x}$ in V.

   (b) Give an example of a scalar multiplication operation on a set V which is not $\mathbb{R}^n$. For full credit, your answer must explicitly state the set V, the field $\mathbb{F}$ and the scalar multiplication operation.   [2 pts]

   Solution: There are many examples. One example is to let $V = \mathcal{P}_n(\mathbb{R})$ which is the set of polynomials of degree at most n with real coefficients and to let $\mathbb{F}$ be the real numbers. Then for $\lambda \in \mathbb{R}$ and $p(x) = a_0 + a_1 x + \cdots + a_n x^n \in \mathcal{P}_n(\mathbb{R})$ we define scalar multiplication by

   $$\lambda p(x) = \lambda(a_0 + a_1 x + \cdots + a_n x^n) = \lambda a_0 + \lambda a_1 x + \cdots + \lambda a_n x^n.$$

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