Exercise 01

Please attempt all of the following problems before the due date. Your grade on this assignment will be calculated from the best two answers.

Problem 01.1

(Module 006) Consider arrows drawn on a flat sheet of paper, with addition defined in the usual graphical head-to-tail fashion, and multiplication defined to act on only the length of the vector. Use Euclidean geometry to confirm that this system is a vector space.

Answer 01.1

Put all of your calculations here. When you have completed all of the problems, wrap the resulting file and e-mail it to me at rgowdy@saturn.vcu.edu.

Problem 01.2

(Module 007) Consider the vector space $\mathbb{R}^2$ of real number pairs with addition defined by

$$(x_1, y_1) + (x_2, y_2) = (x_1 + x_2, y_1 + y_2)$$

and multiplication by a scalar defined by

$$a(x, y) = (ax, ay).$$

Use the definition of linear independence to show that the number pairs $(1, 0), (0, 1), (1, 1)$ are not linearly independent.

Answer 01.2

Put all of your calculations here. When you have completed all of the problems, wrap the resulting file and e-mail it to me at rgowdy@saturn.vcu.edu.

Problem 01.3

(Module 007) Write the expansion of a vector $v$ in the form

$$v = \begin{bmatrix} 7 & 4 & 8 & 6 \end{bmatrix} \begin{bmatrix} e_1 \\ e_2 \\ e_3 \\ e_4 \end{bmatrix}$$
and use Scientific Notebook to do the following: (1) Copy the expression to the answer section below. Mark the matrix product with the mouse and press Ctrl-E to expand it. (2) Construct the expression yourself by locating the "matrix" tool and creating a 1 by 4 matrix and a 4 by 1 matrix.

Answer 01.3

Put all of your calculations here. When you have completed all of the problems, wrap the resulting file and e-mail it to me at rgowdy@saturn.vcu.edu.