Assignment #2

Due on Friday, January 30, 2009

Read Section 1.5 on *Euclidean Spaces* in Messer (pp. 21–27).

Do the following problems

1. Consider the vectors v_1, v_2 and v_3 in $\mathbb{R}^3$ given by

$$v_1 = \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix}, \quad v_2 = \begin{pmatrix} 2 \\ -3 \\ 1 \end{pmatrix}, \quad \text{and} \quad v_3 = \begin{pmatrix} 0 \\ 7 \\ -3 \end{pmatrix}.$$

   Show that $v_3 \in \text{span}\{v_1, v_2\}$.

2. Let v_1, v_2 and v_3 be as in Problem 1 above. Use the result of Problem 1 to show that

$$\text{span}\{v_1, v_2, v_3\} = \text{span}\{v_1, v_2\}.$$

   Note: You need to show that one span is a subset of the other, and conversely, the other is a subset of the one.

3. Let v_1 and v_2 be as in Problem 1 above. Show that $\text{span}\{v_1, v_2\}$ is a plane through the origin in $\mathbb{R}^3$ and give the equation of the plane.

4. Let v_1 and v_2 be as in Problem 1 above. Find a vector in $\mathbb{R}^3$ which is not in the span of v_1 and v_2. Call the vector v_4 and show that

$$\text{span}\{v_1, v_2, v_4\} = \mathbb{R}^3.$$

5. Let v_1 and v_2 be as in Problem 1 above. Determine, if possible, a value of c for which the vector

$$\begin{pmatrix} 4 \\ 1 \\ c \end{pmatrix}$$

   lies in $\text{span}\{v_1, v_2\}$. How many values of c with that property are there?