MATH 2050 – Linear Algebra I – Section 003   Assignment #1
Fall 2012

Instructions

- Answer each question completely; justify your answers.
- This assignment is due at

The following symbols will be used to represent certain sets of numbers:

$$\begin{array}{ll} \mathbb{Z} & \text{the set of integers} \\ \mathbb{N} & \text{the set of natural numbers, namely } \{1, 2, 3, \ldots\} \\ \mathbb{R} & \text{the set of real numbers} \\ \mathbb{Q} & \text{the set of rational numbers} \end{array}$$

1. Are the vectors u and v parallel? Explain why or why not.

   (a) $\mathsf{u} = \begin{bmatrix} \frac{1}{2} \\ 7 \end{bmatrix}$, $\mathsf{v} = \begin{bmatrix} 4 \\ 14 \end{bmatrix}$.

   (b) $\mathsf{u} = \begin{bmatrix} -3 \\ 17 \end{bmatrix}$, $\mathsf{v} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$.

   (c) $\mathsf{u} = \begin{bmatrix} 2 \\ -\frac{1}{3} \end{bmatrix}$, $\mathsf{v} = \begin{bmatrix} -6 \\ 1 \end{bmatrix}$.

2. Express $\mathsf{u} = \begin{bmatrix} 4 \\ -3 \end{bmatrix}$ as a linear combination of $\mathsf{v}_1 = \begin{bmatrix} 7 \\ 2 \end{bmatrix}$ and $\mathsf{v}_2 = \begin{bmatrix} -1 \\ 1 \end{bmatrix}$.

3. Is $\mathsf{u} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ a linear combination of $\mathsf{v}_1 = \begin{bmatrix} 0 \\ 3 \\ 5 \end{bmatrix}$, $\mathsf{v}_2 = \begin{bmatrix} 1 \\ -1 \\ 2 \end{bmatrix}$ and $\mathsf{v}_3 = \begin{bmatrix} 2 \\ -1 \\ 9 \end{bmatrix}$?

4. Let $\mathsf{u} = \begin{bmatrix} 1 \\ 2 \\ 3 \\ -1 \end{bmatrix}$ and $\mathsf{v} = \begin{bmatrix} 3 \\ 1 \\ -1 \\ 1 \end{bmatrix}$. Describe the plane spanned by u and v. Does $\mathsf{w} = \begin{bmatrix} 2 \\ 0 \\ 1 \\ 3 \end{bmatrix}$ belong to this plane?