

Math 54 worksheet, August 31, 2009

1. Let

$$\mathbf{a}_1 = \begin{bmatrix} 1 \\ 4 \\ -2 \end{bmatrix}, \mathbf{a}_2 = \begin{bmatrix} -2 \\ -3 \\ 7 \end{bmatrix}, \text{ and } \mathbf{b} = \begin{bmatrix} 4 \\ 1 \\ h \end{bmatrix}.$$

For what values of  $h$  is  $\mathbf{b}$  in the plane spanned by  $\mathbf{a}_1$  and  $\mathbf{a}_2$ ?

2. Give a geometric description of  $\text{Span}\{\mathbf{v}_1, \mathbf{v}_2\}$ , where

$$\mathbf{v}_1 = \begin{bmatrix} 3 \\ 0 \\ 2 \end{bmatrix} \text{ and } \mathbf{v}_2 = \begin{bmatrix} -2 \\ 0 \\ 3 \end{bmatrix}.$$

3. Construct a  $3 \times 3$  matrix  $A$  with non-zero entries, and a vector  $\mathbf{b}$  in  $\mathbf{R}^3$  such that  $\mathbf{b}$  is *not* in the set spanned by the columns of  $A$ .
4. Put the following matrix in reduced row echelon form:

$$\begin{bmatrix} 1 & -2 & -1 & 3 & 0 \\ -2 & 4 & 5 & -15 & 3 \\ 3 & -6 & -6 & 8 & 2 \end{bmatrix}$$