Assignment 5	**MATH 2050** **SOLUTIONS**	Fall 2004

1. Suppose $a\mathsf{e} + b\mathsf{f} = \mathbf{0}$. Taking the dot product with e and using $\mathsf{f} \cdot \mathsf{e} = 0$ gives $a\mathsf{e} \cdot \mathsf{e} = 0$. Since $\mathsf{e} \neq \mathbf{0}$, it follows that $\mathsf{e} \cdot \mathsf{e} \neq 0$, so $a = 0$. Similarly, taking the dot product with f gives $b = 0$.

2. We are given that $\mathsf{w} = a\mathsf{u} + b\mathsf{v}$ for some scalars a and b. So $a\mathsf{u} + b\mathsf{v} + (-1)\mathsf{w} = \mathbf{0}$. Since not all coefficients on the left are 0 (the coefficient of w is -1), the vectors are linearly dependent.

3. $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 2 & 3 \end{bmatrix}$

4. Since $A = \begin{bmatrix} 1 & 0 \\ 2 & 4 \\ -3 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 & -3 \\ 0 & 4 & 5 \end{bmatrix}$, $a_{11} = 1$, a_{13} is not defined, $a_{21} = 2$, b_{32} is not defined, $b_{12} = 2$ and $b_{22} = 4$.

5. $\begin{bmatrix} 1 & -1 & 1 & -2 \\ 3 & 5 & -2 & 2 \\ 0 & 3 & 4 & -7 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \\ w \end{bmatrix} = \begin{bmatrix} 0 \\ 1 \\ -1 \end{bmatrix}$

6. $AB = \begin{bmatrix} -2 & 6 \\ -1 & 6 \\ 3 & 13 \end{bmatrix}$; BA is not defined.

7. Let $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$. Then $AB = \begin{bmatrix} b & -a \\ d & -c \end{bmatrix}$ and $BA = \begin{bmatrix} -c & -d \\ a & b \end{bmatrix}$. Now $AB = BA$ implies $b = -c$ and $a = d$, so $A = \begin{bmatrix} a & b \\ -b & a \end{bmatrix}$.

