

1. Let  $A = \begin{bmatrix} 4 & -2 \\ -3 & 9 \end{bmatrix}$ , and let  $\mathbf{u} = \begin{bmatrix} 1 \\ -3 \end{bmatrix}$ ,  $\mathbf{v} = \begin{bmatrix} 4 \\ 7 \end{bmatrix}$ , and  $\mathbf{w} = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$ . Compute  $A\mathbf{u}$ ,  $A\mathbf{v}$  and  $A\mathbf{w}$ .

2. Let  $A = \begin{bmatrix} -1 & 0 & -1 \\ 0 & -1 & -1 \\ 0 & 4 & 4 \end{bmatrix}$ . Find a basis for the null space of  $A$ .

3. Solve for  $\lambda$  :  $\lambda^2 + 3\lambda = -2$ .