

Solutions to Problem set Vector Operations and Linear Combinations

1. a. $\mathbf{u} + \mathbf{v} = \begin{bmatrix} -1 \\ 1 \end{bmatrix}$

b. $\mathbf{u} + \mathbf{v} = \begin{bmatrix} 0 \\ 4 \end{bmatrix}$

c. $\mathbf{u} + \mathbf{v} = \begin{bmatrix} 3 \\ -2 \\ 11 \end{bmatrix}$

2. a. $c\mathbf{u} = \begin{bmatrix} -8 \\ 8 \end{bmatrix}$

b. $c\mathbf{u} = \begin{bmatrix} -6 \\ -6 \end{bmatrix}$

c. $c\mathbf{u} = \begin{bmatrix} 9 \\ -9 \\ -18 \end{bmatrix}$

3. a. $c_1\mathbf{v}_1 + c_2\mathbf{v}_2 + c_3\mathbf{v}_3 = \begin{bmatrix} 35 \\ 53 \end{bmatrix}$

b. $c_1\mathbf{v}_1 + c_2\mathbf{v}_2 + c_3\mathbf{v}_3 = \begin{bmatrix} 9 \\ 0 \end{bmatrix}$

c. $c_1\mathbf{v}_1 + c_2\mathbf{v}_2 + c_3\mathbf{v}_3 = \begin{bmatrix} -3 \\ -2 \\ 9 \end{bmatrix}$

d. $c_1\mathbf{v}_1 + c_2\mathbf{v}_2 + c_3\mathbf{v}_3 = \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$

4. a. $A\mathbf{v} = \begin{bmatrix} -45 \\ 18 \end{bmatrix}$

b. $A\mathbf{v} = \begin{bmatrix} 8 \\ -8 \end{bmatrix}$

c. $A\mathbf{v} = \begin{bmatrix} 2 \\ 0 \\ 21 \end{bmatrix}$

d. $A\mathbf{v} = \begin{bmatrix} -1 \\ 2 \\ 3 \end{bmatrix}$