1. For the vectors \( \mathbf{v} = \begin{bmatrix} 3 \\ 1 \\ -2 \end{bmatrix} \), \( \mathbf{w} = \begin{bmatrix} 4 \\ -2 \\ 1 \end{bmatrix} \), \( \mathbf{F} = \begin{bmatrix} 6 \\ -8 \\ 7 \end{bmatrix} \) and \( \mathbf{G} = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} \)

(a) is the vector \( \mathbf{F} \) a linear combination of the vectors \( \mathbf{v} \) and \( \mathbf{w} \)?
(b) is the vector \( \mathbf{G} \) a linear combination of the vectors \( \mathbf{v} \) and \( \mathbf{w} \)?
(c) find a vector of length three which points in a direction opposite to the vector \( \mathbf{G} \)
(d) calculate the angle between the vectors \( \mathbf{v} \) and \( \mathbf{F} \).

2. For the vectors \( \mathbf{v} = \begin{bmatrix} 3 \\ 2 \end{bmatrix} \) and \( \mathbf{w} = \begin{bmatrix} -1 \\ 1 \end{bmatrix} \)
sketch all the linear combinations of the form \( c\mathbf{v} + d\mathbf{w} \), where \( 0 \leq c \leq 1 \) and \( -2 \leq d \leq 0 \).

3. Find an example of three vectors \( \mathbf{u}, \mathbf{v}, \) and \( \mathbf{w} \) where \( \mathbf{w} \) is a linear combination of \( \mathbf{u} \) and \( \mathbf{v} \), but \( \mathbf{u} \) is not a linear combination of \( \mathbf{v} \) and \( \mathbf{w} \).

recommended book exercises (not to be handed in)

- section 1.1 # 1–25 odd
- section 1.2 # 1–5 odd, 7a, b, 9, 11, 13, 16, 27