Worksheet 6

Name: _____   Score: _____

1. Let W be the subspace spanned by the vectors. Find a basis for the orthogonal complement $W^{\perp}$ of W.

   (a)
   $$\begin{bmatrix} -5 \\ -25 \\ -1 \\ 24 \end{bmatrix}, \quad \begin{bmatrix} 4 \\ 20 \\ 1 \\ -19 \end{bmatrix}.$$

   (b)
   $$\begin{bmatrix} -3 \\ -15 \\ -15 \\ 0 \end{bmatrix}, \quad \begin{bmatrix} 2 \\ 10 \\ 10 \\ 1 \end{bmatrix}.$$

   (c)
   $$\begin{bmatrix} 0 \\ 4 \\ 0 \\ 16 \end{bmatrix}, \quad \begin{bmatrix} 4 \\ -5 \\ 3 \\ 2 \end{bmatrix}, \quad \begin{bmatrix} -2 \\ -2 \\ 2 \\ -12 \end{bmatrix}.$$

2. Decide whether the linear system of equations $A\vec{x} = \vec{b}$ has a solution. If not, find a least squares solution.

   (a)
   $$A = \begin{bmatrix} -3 & 1 \\ 0 & 1 \\ 0 & 2 \end{bmatrix}, \quad \vec{b} = \begin{bmatrix} -2 \\ -2 \\ 3 \end{bmatrix}$$

   (b)
   $$A = \begin{bmatrix} 2 & 1 \\ -4 & -3 \\ 2 & 1 \end{bmatrix}, \quad \vec{b} = \begin{bmatrix} 2 \\ -4 \\ -2 \end{bmatrix}$$

   (c)
   $$A = \begin{bmatrix} 2 & 1 \\ -4 & -5 \\ -1 & -1 \\ -2 & 2 \end{bmatrix}, \quad \vec{b} = \begin{bmatrix} 5 \\ 3 \\ 3 \\ -4 \end{bmatrix}$$