Linear Algebra

1. The five vectors

$$\mathbf{x}_1 = \begin{pmatrix} 1 \\ 2 \\ 2 \end{pmatrix}, \quad \mathbf{x}_2 = \begin{pmatrix} 2 \\ 5 \\ 4 \end{pmatrix}, \quad \mathbf{x}_3 = \begin{pmatrix} 1 \\ 3 \\ 2 \end{pmatrix}, \quad \mathbf{x}_4 = \begin{pmatrix} 2 \\ 7 \\ 4 \end{pmatrix}, \quad \mathbf{x}_5 = \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}$$

span R^3. Find three of these vectors that form a basis for R^3.
(This is exercise 10 on page 151 of the textbook.)

2. Find the coordinates of the vector $\begin{pmatrix} 1 \\ 1 \end{pmatrix}$ with respect to the ordered basis $\left[\begin{pmatrix} 5 \\ 3 \end{pmatrix}, \begin{pmatrix} 3 \\ 2 \end{pmatrix} \right]$. In other words, find numbers c_1 and c_2 such that

$$\begin{pmatrix} 1 \\ 1 \end{pmatrix} = c_1 \begin{pmatrix} 5 \\ 3 \end{pmatrix} + c_2 \begin{pmatrix} 3 \\ 2 \end{pmatrix}.$$

(This is part of exercise 4 on page 161 of the textbook.)