Homework, MA 213 **Due: 2014-Nov-17**

You may work with others to figure out how to do questions, and you are welcome to look for answers in the book, online, by talking to someone who had the course before, etc. However, you must write the answers on your own. You must also show your work (you may, of course, quote any result from the book).

1. For each space find the matrix changing a vector representation with respect to B to one with respect to D.

   (a) $V = \mathbb{R}^3$, $B = \mathcal{E}_3$, $D = \langle \begin{pmatrix}1\\2\\3\end{pmatrix}, \begin{pmatrix}1\\1\\1\end{pmatrix}, \begin{pmatrix}0\\1\\-1\end{pmatrix} \rangle$

   (b) $V = \mathbb{R}^3$, $B = \langle \begin{pmatrix}1\\2\\3\end{pmatrix}, \begin{pmatrix}1\\1\\1\end{pmatrix}, \begin{pmatrix}0\\1\\-1\end{pmatrix} \rangle$, $D = \mathcal{E}_3$

   (c) $V = \mathcal{P}_2$, $B = \langle x^2, x^2 + x, x^2 + x + 1 \rangle$, $D = \langle 2, -x, x^2 \rangle$

2. Find the P and Q to express H via PHQ as a block partial identity matrix.

$$H = \begin{pmatrix}2 & 1 & 1\\3 & -1 & 0\\1 & 3 & 2\end{pmatrix}$$

3. Project the vector to the line.

$$\vec{v} = \begin{pmatrix}3\\2\end{pmatrix} \qquad L = \{ c \begin{pmatrix}1\\-1\end{pmatrix} \mid c \in \mathbb{R} \}$$

4. Express this nonsingular matrix as a product of elementary reduction matrices.

$$\begin{pmatrix}1 & 2 & 0\\2 & -1 & 0\\3 & 1 & 2\end{pmatrix}$$