

Assignment 3

[2pt] 1. Find the coordinates of $p(x) = -6 + x - 3x^2$ with respect to the basis $\mathcal{B} = \{1 + x^2, 1 - x + 2x^2, -1 - x + x^2\}$ of P_2 .

[4pt] 2. Find the change of coordinates matrix to and from the standard basis of \mathbb{R}^3 and $\mathcal{B} = \left\{ \begin{bmatrix} 1 \\ -1 \\ -1 \end{bmatrix}, \begin{bmatrix} 0 \\ -1 \\ -2 \end{bmatrix}, \begin{bmatrix} 2 \\ 1 \\ 5 \end{bmatrix} \right\}$.

[2pt] 3. Show that the mapping $L : \mathbb{R}^3 \rightarrow P_1$ given by $L \left(\begin{bmatrix} a \\ b \\ c \end{bmatrix} \right) = (a + b) + (b + c)x$ is linear.

[2pt] 4. Show that the mapping $M : \mathbb{R}^3 \rightarrow P_1$ given by $M \left(\begin{bmatrix} a \\ b \\ c \end{bmatrix} \right) = (ab) + (bc)x$ is not linear.