

Name: _____

Section: _____

1. Consider the basis $\mathcal{B} = \{1 - x^2, 2 + 4x + x^2, -4x - 2x^2\}$ of the space of polynomials with degree less than or equal to 2 with real coefficients, \mathcal{P}_2 . Find the coordinates of $x^2 + x + 1$ in this basis.

2. Consider the linear transformation $T : M_{2 \times 2} \rightarrow M_{2 \times 2}$ given by $T(A) = BA$ where B is the matrix

$$B = \begin{pmatrix} 2 & 1 \\ 1 & 1 \end{pmatrix}$$

Calculate the matrix of T with respect to the standard basis for $M_{2 \times 2}$, i.e., the basis

$$\left\{ \begin{pmatrix} 1 & 0 \\ 0 & 0 \end{pmatrix}, \begin{pmatrix} 0 & 1 \\ 0 & 0 \end{pmatrix}, \begin{pmatrix} 0 & 0 \\ 1 & 0 \end{pmatrix}, \begin{pmatrix} 0 & 0 \\ 0 & 1 \end{pmatrix} \right\}.$$