1. Let $\mathscr{A} = \{\mathbf{a}_1, \mathbf{a}_2, \mathbf{a}_3\}$ and $\mathscr{D} = \{\mathbf{d}_1, \mathbf{d}_2, \mathbf{d}_3\}$ be bases of a vector space V. Suppose that $\mathbf{a}_1 = 4\mathbf{d}_1 - \mathbf{d}_2$, $\mathbf{a}_2 = -\mathbf{d}_1 + \mathbf{d}_2 + \mathbf{d}_3$ and $\mathbf{a}_3 = \mathbf{d}_2 - 2\mathbf{d}_3$.
   a. Find the change of coordinate matrix from $\mathscr{A}$ to $\mathscr{D}$.

   b. Find $[\mathbf{x}]_{\mathscr{D}}$ for $\mathbf{x} = 3\mathbf{a}_1 + 4\mathbf{a}_2 + \mathbf{a}_3$.

2. In $\mathbb{P}_2$, find the change of coordinate matrix from the basis $\mathscr{B} = \{1 - 3x^2,\ 2 + x - 5x^2,\ 1 + 2x\}$ to the standard basis $\{1, x, x^2\}$. Then write x^2 as a linear combination of the polynomials in $\mathscr{B}$.