1. Let $\mathbf{b_1} = \begin{bmatrix} 2 \\ 1 \\ 0 \end{bmatrix}$, $\mathbf{b_2} = \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$, $\mathbf{b_3} = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$, and $\mathcal{B} = \{\mathbf{b_1}, \mathbf{b_2}, \mathbf{b_3}\}$
   (a) Show that $\mathcal{B}$ is a basis for $\mathbb{R}^3$
   (b) Find the $\mathcal{B}$-coordinates for the vectors $\mathbf{x} = \begin{bmatrix} -1 \\ 4 \\ 2 \end{bmatrix}$ and $\mathbf{y} = \begin{bmatrix} 6 \\ 2 \\ -1 \end{bmatrix}$

2. Let $\begin{aligned} p_1(t) &= 2 + t \\ p_2(t) &= 1 + t \\ p_3(t) &= 1 + t + t^2 \end{aligned}$ and $\mathcal{B} = \{p_1(t), p_2(t), p_3(t)\}$
   (a) Show that $\mathcal{B}$ is a basis for $\mathbb{P}_2$
   (b) Find the $\mathcal{B}$-coordinates for the polynomials $q(t) = -1 + 4t + 2t^2$ and $r(t) = 6 + 2t - t^2$