(1) A basis for $\mathbb{R}^2$ is $\mathcal{C} = \{\mathbf{e}_1 + \mathbf{e}_2, \mathbf{e}_1\}$. A basis for $\mathbb{P}_2$ is $\mathcal{B} = \{x - 2x^2, 1 + x^2, 1 + x\}$. The linear transformation $T : \mathbb{P}_2 \to \mathbb{R}^2$ is defined by

$$T(p(x)) = \begin{bmatrix} p(0) + p(1) \\ p(1) + p(2) \end{bmatrix}.$$

Find the matrix $\underset{\mathcal{C} \leftarrow \mathcal{B}}{[T]}$ of T with respect to the bases $\mathcal{B}$ and $\mathcal{C}$.