Let $T: \mathbb{P}_2 \to \mathbb{P}_1$ be the function defined by
\[ T(p) = p(1)x + p(2). \]

(a) Find $T(1)$, $T(x)$, and $T(x^2)$.

(b) Find the coordinate vectors relative to $C$ of $T(1)$, $T(x)$, and $T(x^2)$.
\[ B = \{1, x, x^2\} \]
\[ C = \{1, x\} \]

(c) $T$ is a linear transformation (you do not have to check this). Find the matrix of $T$ relative to the bases $B$ and $C$.

(d) Is $T$ one-to-one? Onto?

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