
Exercise 1 Suppose $T : \mathbb{P}^2 \rightarrow \mathbb{P}^3$ is a linear transformation such that

$$T(x^2) = x^3, \quad T(x + 1) = 0, \quad T(x - 1) = x$$

Find $T(x^2 + x + 1)$.

$$T(x^2 + x + 1) = \dots \dots$$

Source

[Nicholson] W. Keith Nicholson, *Linear Algebra with Applications*, Lyryx 2021, Open Edition, Exercises 7.1.4 (c).