1. True or False?

Let $B = \langle 1, 1+x, 1+x+x^2 \rangle$ be a basis for $\mathcal{P}_2$. Then the map $\mathrm{Rep}_B : \mathcal{P}_2 \to \mathbb{R}^3$ given by

$$p \mapsto \mathrm{Rep}_B(p)$$

is an isomorphism.

2. True or False?

The function $f : \mathbb{R}^2 \to \mathbb{R}^3$ given by

$$\begin{pmatrix} x \\ y \end{pmatrix} \mapsto \begin{pmatrix} x \\ x+y \\ y \end{pmatrix}$$

is linear.

2. True or False?

The function $f : \mathbb{R}^2 \to \mathbb{R}^3$ given by

$$\begin{pmatrix} x \\ y \end{pmatrix} \mapsto \begin{pmatrix} x \\ x+y \\ y \end{pmatrix}$$

is linear.

**Follow-up.** What is $\mathscr{N}(f)$? What is $\mathscr{R}(f)$?

3. True or False?

The function $f : \mathbb{R} \to \mathbb{R}$ given by $f(x) = 2x - 1$ is linear.

4. True or False?

Every nonzero linear map $f : \mathbb{R}^2 \to \mathbb{R}^2$ is an isomorphism.

5. True or False?

Every nonzero linear map $f : \mathbb{R} \to \mathbb{R}$ is an isomorphism.