

You must show all your work to receive credit. Calculators are allowed.

**Problem 1:** (3 points) Let  $P$  be the vector space of all polynomials and let

$$S = \{1, t, t^2 + t, t^2 + 3t - 1, t^4 + t^3 + 5t^2 - 6\}.$$

a) Is  $2t^4 + 2t^3$  in the span of  $S$ ?

$$\text{Yes: } 2t^4 + 2t^3 = 2 \cdot (t^4 + t^3 + 5t^2 - 6) - 10 \cdot (t^2 + t) + 10 \cdot (t) + 12 \cdot (1) \\ \in \text{span } S$$

b) Is  $S$  a linearly independent set? Why or why not?

$$\text{No: } 1 \cdot (t^2 + 3t - 1) - 1 \cdot (t^2 + t) - 2 \cdot (t) + 1 \cdot (1) = \vec{0}$$

c) Is  $S$  a subspace of  $P$ ?

$$\text{No: } \vec{0} \notin S$$