

## Exercise 2

1. Prove that vectors of coefficients of non-negative polynomials on  $[0, 1]$ ,

$$\{\mathbf{x} \in \mathbb{R}^N : x_1 + x_2t + x_3t^2 + \cdots + x_Nt^{N-1} \geq 0 \text{ for all } 0 \leq t \leq 1\}$$

form a proper cone.

2. Let  $S$  be nonempty. Prove that the following are equivalent:

(a)  $S$  is affine;

(b)  $S$  is of the form  $x + V$  for some subspace  $V \subset \mathbb{R}^n$  and  $x \in S$ .

3. Let  $S := \text{aff}(\{x_0, \dots, x_m\})$ , where  $x_i \in \mathbb{R}^n$ . Prove that  $\text{span}\{x_1 - x_0, \dots, x_m - x_0\}$  is the subspace parallel to  $S$ .