

Exercise I

1. Determine whether the following sets are affine algebraic sets

- (a) $\mathbf{SL}(n, \mathbb{C}) := \{A \in \text{Mat}(n \times n, \mathbb{C}) \mid \det A = 1\}$,
- (b) $\{(\cos t, \sin t) \mid t \in [0, 2\pi]\} \subseteq \mathbb{R}^2$,
- (c) $\{(t, \sin t) \mid t \in \mathbb{R}\} \subseteq \mathbb{R}^2$.

2. Show that

- (a) an arbitrary intersection of affine algebraic sets is an affine algebraic set,
i.e.,

$$\bigcap_{i \in I} V(S_i) = V(\bigcup_{i \in I} S_i);$$

- (b) a finite union of affine algebraic sets is an affine algebraic set,
- (c) any finite set is an affine algebraic set.