Name: ______________________________

1. Suppose Spec$R = \bigcup_{i \in I} D(f_i)$, for some $f_i \in R$. (Recall $D(f) = \{\mathfrak{p} \subset R \text{ prime} \mid f \notin \mathfrak{p}\}$.) Show there exists a finite subset $J \subset I$ such that Spec$R = \bigcup_{j \in J} D(f_j)$.

2. Let $Y \subset \mathrm{Spec}(\mathbb{C}[x, y])$ be the set of closed points (n^2, n^3), for $n \in \mathbb{N}$. (In other words, Y consists of the maximal ideals $(x - n^2, y - n^3) \subset \mathbb{C}[x, y]$, for $n \in \mathbb{N}$.) What is the closure $\overline{Y} \subset \mathrm{Spec}(\mathbb{C}[x, y])$?

3. Describe the topological space $\mathrm{Spec}(\mathbb{R}[x, y]/(x^2 + y^2 = -1))$.