True or false:

1. The image of the map $\mathbb{C} \to \mathbb{C}^3$ sending $t \mapsto (t, t^2, t^3)$ is an algebraic set in $\mathbb{C}^3$ defined by the common vanishing of the polynomials $x^3 - z$ and $x^2 - y$.

2. The diagonal $\{(t, t) \mid t \in k\}$ is a closed subset in the product topology on $k \times k$, where both copies $k$ are given the Zariski topology.

3. If $R$ and $S$ are two finitely generated reduced algebras over an algebraically closed field $k$, then their tensor product $R \otimes_k S$ is also reduced and finitely generated over $k$.

4. The image of any regular mapping $k^n \to k^m$ is always a Zariski closed subset of $k^m$.

5. Let $T : k^3 \to k^2$ be a linear mapping of vector spaces given by left multiplication by the matrix\[
\begin{pmatrix}
1 & 0 & 0 \\
0 & -1 & 0 \\
0 & 0 & 1
\end{pmatrix}.
\]Then $T$ is a regular mapping of algebraic sets and the induced morphism of coordinate rings is injective.