Name: _____ Math 256A Quiz 7 Due Thursday 11/7

1. (a) Consider the affine scheme $\mathbb{A}^1 = \operatorname{Spec} \mathbb{C}[t]$. Give an example of a sheaf of $\mathcal{O}_{\mathbb{A}^1}$-modules that is not quasicoherent, i.e., its values on opens $U \subset \mathbb{A}^1$ are not always the localization of its global sections.

   (b) Let X be a scheme over $\mathbb{C}$. Confirm the assignment $E \mapsto \mathcal{O}(E)$ gives an equivalence from vector bundles over X to locally free quasicoherent sheaves of $\mathcal{O}_X$-modules.

2. (a) Find an $n \in \mathbb{Z}$ and an isomorphism of line bundles $T\mathbb{P}^1 \simeq L_n$ or equivalently an isomorphism of $\mathcal{O}_{\mathbb{P}^1}$-modules $T_{\mathbb{P}^1} \simeq \mathcal{O}_{\mathbb{P}^1}(n)$.

   (b) Consider the smooth curve $E = V(zy^2 - x^3 + z^2x) \subset \mathbb{P}^2$. Show the tangent bundle TE or equivalently tangent sheaf T_E is trivializable.

3. Show the tangent bundle $T\mathbb{P}^2$ is not isomorphic to a sum of line bundles.