Name: ____________________

1. 1. For an affine scheme X, is any map $f : X \to Y$ affine?

   2. For a quasi-compact scheme X, is any map $f : X \to Y$ quasi-compact?

   3. For a quasi-separated scheme X, is any map $f : X \to Y$ quasi-separated?

2. Consider a hypersurface $X = \text{Proj}(\mathbb{C}[x_0, x_1, \ldots, x_n]/(f)) \subset \mathbb{P}^n_{\mathbb{C}}$.

   1. Show $\mathbb{P}^n_{\mathbb{C}} \setminus X \to \mathbb{P}^n_{\mathbb{C}}$ is an affine map.

   2. Construct a finite map $X \to \mathbb{P}^{n-1}_{\mathbb{C}}$.

3. 1. Show $Q_2 = \text{Spec}(\mathbb{C}[x, y, z]/(x^2 + y^2 + z^2))$ is normal.

   2. Find the normalization of $X = \text{Spec}(\mathbb{C}[x, xy, y^2, y^3])$.

   3. Let $p \in X = \text{Spec}(\mathbb{C}[x, xy, y^2, y^3])$ be the closed point given by the maximal ideal $(x, xy, y^2, y^3) \subset \mathbb{C}[x, xy, y^2, y^3]$. Find a function $f \in \Gamma(X \setminus p, \mathcal{O}_X)$ that does not extend to X in the sense that it is not the restriction of an element of $\Gamma(X, \mathcal{O}_X) = \mathbb{C}[x, xy, y^2, y^3]$.