

Name: _____

1. Show $\Gamma(\mathbb{P}_k^n, \mathcal{O}_{\mathbb{P}_k^n}) \simeq k$.

2. 1. Show for any ring R there is a natural isomorphism $\mathrm{Hom}_{\mathrm{Sch}}(\mathrm{Spec}(R), \mathbb{A}^1) \xrightarrow{\sim} R$.

2. Show for any scheme X there is a natural isomorphism $\mathrm{Hom}_{\mathrm{Sch}}(X, \mathbb{A}^1) \xrightarrow{\sim} \Gamma(X, \mathcal{O}_X)$.

3. 1. Show for any scheme X and ring R there is a natural bijection

$$\mathrm{Hom}_{\mathrm{Sch}}(X, \mathrm{Spec}(R)) \xrightarrow{\sim} \mathrm{Hom}_{\mathrm{Rings}}(R, \Gamma(X, \mathcal{O}_X))$$

2. Interpret the previous bijection as an adjunction.