

MATH 256A: PROBLEM SET #3
DUE 9/21/2006

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Exercise 1. Let X be a scheme over $\text{Spec } k$, and consider $\text{Spec } k[t]$ over $\text{Spec } k$ in the obvious way. Describe the morphisms from X to $\text{Spec } k[t]$ over $\text{Spec } k$. How do these compare to the morphisms from X to $\text{Spec } \mathbb{Z}[t]$ as abstract schemes?

Exercise 2. Use the previous exercise to describe the structure sheaf of a scheme X in terms of morphisms to $\text{Spec } \mathbb{Z}[t]$, and in the case that X is over $\text{Spec } k$, in terms of morphisms to $\text{Spec } k[t]$ over $\text{Spec } k$.

Exercise 3. Do Hartshorne, Exercise 2.9 of Chapter II (see §1 of Chapter I for the definition of irreducible).

Exercise 4. Do Hartshorne, Exercise 2.13 of Chapter II.

Exercise 5. Do Hartshorne, Exercise 2.14 of Chapter II, except part (d).

Exercise 6. Do Hartshorne, Exercise 2.18 of Chapter II.

Exercise 7. Do Hartshorne, Exercise 2.19 of Chapter II.