Algebra III/Introduction to Algebra III: Scheme Theory

Due: Please upload solutions to NUCT by Tuesday, July 26, 2022.

Problem 1. Let k be a field, and let

$$X = \mathbb{P}^1_k \xrightarrow{\ f\ } S = \mathrm{Spec}(k)$$

be a projective line. The $\mathcal{O}_X$-module of differentials $\Omega^1_{X/S}$ is a line bundle on X. Use local trivializations to calculate its degree.