

## HOMEWORK #6

Due: April 15, 2026

1. Read Hartshorne III.1–3. Focus on understanding the statements, skipping proofs as needed (for now).
2. Let  $X$  be an integral noetherian scheme. Show that  $\text{Cl}(X \times \mathbb{P}^n) \cong \text{Cl}(X) \oplus \mathbb{Z}$ .
3. Let  $X$  be the cuspidal cubic curve defined by  $\{x^3 - y^2z = 0\}$  in  $\mathbb{P}_k^2$  (for a field  $k$ ). Compute  $\text{Cl}(X)$  and  $\text{Pic}(X)$ .
4. (Hartshorne §III.4) 1, 3, 5, 6, 7.
5. (Hartshorne §III.5) 1, 2, 6.