

## HOMEWORK 10

This problem set is due Monday November 10. You may work on the problem set in groups; however, the final write-up must be yours and reflect your own understanding.

**Problem 0.1.** *Let  $X$  be a non-singular affine variety. Prove that  $Cl(X) = 0$  if and only if the coordinate ring  $k[X]$  is a UFD.*

**Problem 0.2.** *Let  $X$  be a non-singular variety. Prove that the projection  $\pi : X \times \mathbb{A}^1 \rightarrow X$  induces a surjective homomorphism  $\pi^* : Cl(X) \rightarrow Cl(X \times \mathbb{A}^1)$ .*

**Problem 0.3.** *Let  $X$  be a non-singular variety. Use the previous problem to prove that  $Cl(X \times \mathbb{A}^n)$  is isomorphic to  $Cl(X)$ .*

**Problem 0.4.** *Prove that an irreducible, non-degenerate curve of degree  $n$  in  $\mathbb{P}^n$  is the rational normal curve of degree  $n$ .*