

### PROBLEM SET 3 (DUE ON THURSDAY, FEBRUARY 9)

(All Exercises are references to the December 31, 2022 version of *Foundations of Algebraic Geometry* by R. Vakil.)

**Problem 1.** Exercise 15.2.Y (sections of a twist of a quasicohherent sheaf by a high power of a line bundle)

**Problem 2.** Classify all morphisms (of quasicohherent sheaves on  $\mathbb{P}_k^1$ )

$$\mathcal{O}_{\mathbb{P}_k^1}(m) \rightarrow \mathcal{O}_{\mathbb{P}_k^1}(n)$$

for  $m, n \in \mathbb{Z}$ .

**Problem 3.** Exercise 17.4.B (automorphisms of  $\mathbb{P}^n$ )

**Problem 4.** Exercise 17.4.L (dimensions of images of maps from projective space)