

## PROBLEM SET 8 (DUE ON THURSDAY, NOV 3)

(All Exercises are references to the August 29, 2022 version of *Foundations of Algebraic Geometry* by R. Vakil.)

- Problem 1.** Exercise 9.1.I(d) (an example of scheme-theoretic intersection not distributing over scheme-theoretic union)
- Problem 2.** A *quadric* in  $\mathbb{A}_k^n$  is a closed subscheme  $V(f)$  cut out by a single polynomial of degree two. Give an example of two quadrics in  $\mathbb{A}_{\mathbb{C}}^2$  intersecting in a single point, and compute the scheme-theoretic intersection. Then give a second example of this, with scheme-theoretic intersection not isomorphic (as schemes) to that in your first example.
- Problem 3.** Exercise 4.5.H(a) (prime ideals of  $(S_{\bullet}[\frac{1}{f}])_0$ )
- Problem 4.** Is  $\text{Proj } k[x, y]/(x^2y)$  affine, where  $x$  and  $y$  have degree 1? Is it reduced?