

PROBLEM SET 1 (DUE ON THURSDAY, SEP 12)

(All Exercises are references to the July 27, 2024 version of *Foundations of Algebraic Geometry* by R. Vakil.)

- Problem 1.** Exercise 2.2.J (stalks of \mathcal{O}_X -modules are $\mathcal{O}_{X,p}$ -modules - you will want to read Section 2.2.13 before doing this)
- Problem 2.** Exercise 2.7.G (support of a section is closed - you will want to read Section 2.7.6 before doing this)
- Problem 3.** Exercise 2.3.C (sheaf Hom)
- Problem 4.** Exercise 2.5.E (gluing sheaves together - the hint given by Vakil will require reading the preceding part of Section 2.5, but you can also do this without using a base if you prefer)
- Problem 5.** Give a single example of a presheaf \mathcal{F} that simultaneously fails both sheaf axioms (identity and gluability, as in Section 2.2.6), and compute its sheafification.