PROBLEM SET 5 (DUE ON THURSDAY, OCT 13)

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

Problem 1. Exercise 5.1.B (irreducible closed subsets of general schemes are closures of points)

Problem 2. Exercise 5.1.E (quasicompact schemes have closed points)

Problem 3. Let k be a field. Let $X = \operatorname{Spec} \mathbb{Z}[x, y]/xy$. Define a natural map $X(k[\epsilon]/\epsilon^2) \to X(k)$, where $X(A)$ is the set of A-valued points of X, and describe the fibers of this map.

Problem 4. Exercise 8.1.D (fiber products of open embeddings - there is a discussion of fiber products in Section 1.3.6)