

## PROBLEM SET 6 (DUE ON OCT 27)

(All Exercises are references to the December 29, 2015 version of *Foundations of Algebraic Geometry* by R. Vakil.)

- Problem 1.** Let  $X = \text{Spec } \mathbb{Z}[x, y]/xy$ . Define a natural map  $X(k[\epsilon]/\epsilon^2) \rightarrow X(k)$ , where  $X(A)$  is the set of  $A$ -valued points of  $X$ , and describe the fibers of this map.
- Problem 2.** Exercise 7.1.B (fiber products of open embeddings - there is a discussion of fiber products in Section 1.3.6)
- Problem 3.** Exercise 7.3.C(b) (quasiseparatedness is affine-local - you might find Exercise 5.1.F helpful)
- Problem 4.** Exercise 7.3.F (application of affine-locality of affine morphisms)
- Problem 5.** Exercise 7.3.K (finite morphisms have finite fibers - you can assume Exercise 7.3.H, but that exercise is worth thinking about as well)
- Problem 6.** Exercise 7.3.Q(a) (open embeddings are locally of finite type, etc)