

## PROBLEM SET 7 (DUE ON THURSDAY, NOV 15)

(All Exercises are references to the November 18, 2017 version of *Foundations of Algebraic Geometry* by R. Vakil.)

- Problem 1.** Exercise 8.2.M (rulings on a quadric surface)
- Problem 2.** Exercise 8.3.A (scheme-theoretic image of a reduced scheme is reduced)
- Problem 3.** Exercise 9.2.I (distinct morphisms remain distinct upon extending the base field)
- Problem 4.** Exercise 9.2.J (extending the base field does not alter whether or not a morphism is a closed embedding)
- Problem 5.** Describe two morphisms  $\mathbb{A}_{\mathbb{C}}^1 \rightarrow \mathbb{A}_{\mathbb{C}}^1$  such that the fiber product  $X = \mathbb{A}_{\mathbb{C}}^1 \times_{\mathbb{A}_{\mathbb{C}}^1} \mathbb{A}_{\mathbb{C}}^1$  using these morphisms has exactly two irreducible components and such that the two irreducible components intersect in exactly two points.