

PROBLEM SET 11 (DUE ON THURSDAY, DEC 1)

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

- Problem 1.** Exercise 11.3.G (sections of morphisms - you may want to read section 9.2 on locally closed embeddings)
- Problem 2.** Exercise 11.4.B (when are morphisms determined by where they send closed points? - you may want to read the preceding exercise/minor remarks and also look at Exercises 3.6.J (on an older homework) and 5.3.F (related))
- Problem 3.** Exercise 11.4.E (graphs of rational maps)
- Problem 4.** Describe the graph of the rational map $\mathbb{A}_{\mathbb{C}}^2 \dashrightarrow \mathbb{A}_{\mathbb{C}}^1$ given by x/y . Can you tell from this graph that this rational map cannot extend to a morphism $\mathbb{A}_{\mathbb{C}}^2 \rightarrow \mathbb{P}_{\mathbb{C}}^1$?
- Problem 5.** Let $n \geq 2$ be an integer. Compute the (maximal) domain of definition of the generalized Cremona transformation

$$C : \mathbb{P}_{\mathbb{C}}^n \dashrightarrow \mathbb{P}_{\mathbb{C}}^n,$$

a rational map given by $[x_0 : \cdots : x_n] \mapsto [x_0^{-1} : \cdots : x_n^{-1}]$ (on closed points with $x_0 \cdots x_n \neq 0$).