

PROBLEM SET 1 (DUE ON THURSDAY, FEBRUARY 4)

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

- Problem 1.** Exercise 13.3.H (sections of a twist of a quasicohherent sheaf by a high power of a line bundle (“twist” is the general term for modifying a sheaf by tensoring with a line bundle))
- Problem 2.** Exercise 13.7.F (being a vector bundle can be checked on stalks)
- Problem 3.** Exercise 13.7.L (degrees of finite morphisms at points)
- Problem 4.** Let $D \subseteq X$ be an effective Cartier divisor. Let $\mathcal{L} = \mathcal{I}_D^\vee$. Let s be the global section of \mathcal{L} given by the inclusion of the ideal sheaf \mathcal{I}_D into \mathcal{O}_X . Show that the vanishing scheme of s is equal to D .