PROBLEM SET 2 (POSTED ON THURSDAY, JANUARY 22)

(All Exercises are references to the October 21, 2025 version of *Foundations of Algebraic Geometry* by R. Vakil.)

Problem 1. 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.

Problem 2. Exercise 15.4.G (div and $D \mapsto O_X(D)$ are inverses)

Problem 3. Exercise 15.4.K (an example of a Weil divisor that is not locally principal)