PROBLEM SET 4 (DUE ON THURSDAY, MARCH 4)

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

Problem 1. Exercise 17.4.D (understanding the degree of a map between curves in terms of fibers over closed points - you will want to read the preceding page or so, and it is worth noting that Exercise 17.4.C is complementary, explaining how to understand degree in terms of fibers over non-closed points)

Problem 2. Exercise 18.2.H (cohomology respects change of base field - ignore the sentence telling you to prove this for H^0 without needing quasicompact + separated, since the H^0 statement still isn't true without those conditions or something close, like qcqs)

Problem 3. Let $C = \operatorname{Proj} \mathbb{C}[x, y, z]/(x^3 + y^3 + z^3)$. Compute $V := H^1(C, \mathcal{O}_C)$. Let G be the automorphism group of C (as a $\mathbb{C}$-scheme). Define a natural action of G on V. Does there exist an element of G acting nontrivially on V? What about a nontrivial element of G acting trivially on V?