Background lecture: Riemann-Roch

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Begin with the statement of Serre duality for a smooth projective curve (using the sheaf of differentials as an explicit dualizing sheaf), and state Riemann-Roch as in Chapter IV of Hartshorne, briefly sketching how it follows from Serre duality.

Spend the remainder of the lecture on computation of examples:

- Defining $g = h^0(C, \Omega^1_C)$, we have $\deg \Omega^1_C = 2g - 2$.
- If $g \geq 2$, then $h^1(C, T_C) = 3g - 3$, where T_C is the tangent sheaf on C, defined as the dual of Ω^1_C.
- If C is a rational curve of degree d in $\mathbb{P}^n$, compute the cohomology of its normal bundle, using the exact sequences for the tangent sheaf of projective space (Example 8.20.1 of Chapter II of Hartshorne) and for the normal bundle itself (preceding Proposition 8.20).