GENERAL NOTES.

HODGE CLUB TALK NOTES

ABSTRACT

Rough general notes.

1 Residue Theorems

Lemma 1.1. *Let A be a graded commutative algebra over $\mathbb{C}$ and let $f = f(x)$ be a polynomial in x with coefficients in A. Then for indeterminants $z_1, \ldots, z_d$,*

$$\mathrm{Res}_x \frac{f(x)}{(x-z_1)\ldots(x-z_d)} = \sum_{i=1}^{d} \frac{f(z_i)}{\prod_{j\neq i}(z_i - z_j)}.$$

Proof. Decompose into simple fractions:

$$\frac{f(x)}{(x-z_1)\ldots(x-z_d)} = F(x) + \sum_{i=1}^{d} \frac{f(z_i)}{\prod_{j\neq i}(z_i - z_j)} \frac{1}{(x-z_i)}.$$

Here $F(x)$ is a polynomial term in x. □

Let

$$h = \frac{f}{\prod_{j=1}^{d}(x-z_j)} \quad \text{and} \quad h_j = \frac{f(z_j)}{\prod_{r\neq j}(z_j - z_r)}, \quad \text{for all } k \geq 0.$$