Math Daily Log

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30 October 2025

Acknowlegdement

This is Evan Style LaTeX template. Thanks to Evan Chen for creating such a beautiful style file.

October 28, 2025

1. Weyl Algebra $\frac{k<x,y>}{xy-yx-1}$.
2. Center of Weyl Algebra is k in characteristic 0.
3. In characteristic p, the center of Weyl Algebra is $k[x^p, y^p]$.
4. Weyl Algebra is simple.
5. x and y can be seen as operators on $k[t]$ by $x : f \mapsto tf$ and $y : f \mapsto \frac{df}{dt}$. This is amazing. I think the structure $xy - yx = 1$ can be used to make some algebra olympiads problems. Very rich and interesting structure. When you interpret as operators on polynomials, everything becomes very concrete and easy to understand. Perfect for a math olympiad problem.

October 29, 2025

1. spiltting field is unique up to isomorphism.
2. Separable. An insparable polynomial: $x^p - t$ over $\mathbb{F}_p(t)$. $x^p - t = (x - u)^p$ in the algebraic closure.
3. A polynomial is separable iff its derivative and f are coprime. In particuplar, over characteristic 0, all irreducible polynomials are separable.
4. A field is perfect if all irreducible polynomials are separable iff every algebraic extension is separable.

5. A finite extension is separable iff $[F : k]_s = [F : k]$ iff $F = k(\alpha_1, ..., \alpha_n)$ where α_i are separable.

6. A finite Normal extensions is a spiltting field of a polynomial. This is amazing.

7. Riemann integral is equivalent to Darboux integral.

October 30, 2025

1. Riemann integrable iff discontinuities has measure 0.

2. A lot of exercises on separable extensions from Aluffi chapter 7.

3. Formal power series $k[[x]]$ on math 250 lecture.