The famed "Drinfel'd Lemma", following Moskovich

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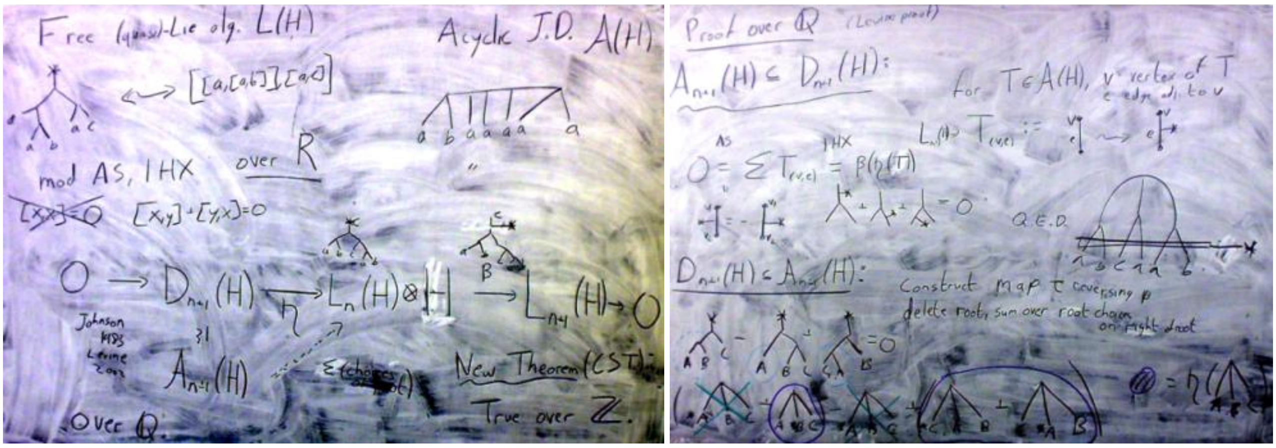


Thm. $sder_n \cong T_n \leftarrow$ unrooted trees on n letters $/AS, IHX$.

$$0 \to T_n \underset{\beta}{\overset{\alpha}{\rightleftarrows}} tder_n \xrightarrow{b} Lie_n \to 0$$

$$\tau : Lie_n \to \frac{tder_n}{\alpha(T_n)} \xrightarrow{I - \alpha\circ\beta} \frac{tder_n}{0}$$

Given α, β, τ, b how make a homotopy?

Eg. $0 \to \mathbb{Z} \xrightarrow{\cdot 2} \mathbb{Z} \to \mathbb{Z}/2 \to 0$

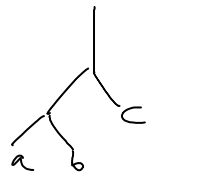
$D[a,b] := [Da,b] - [a,Db]$ $\qquad D[b,a] = [Db,a] - [b,Da]$

$D[[a,b],c] = [[Da,b],c] - [[a,Db],c] - [[a,b],Dc]$

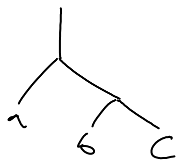
$\tau[a,b] = [Da,b)$ $\qquad D[a,b] = [Da,b] + [a,Db]$

$DX =$

$\tau[[a,b],c] = a\otimes[c,b] + b\otimes[a,c]$



$\tau[a,[b,c]] = a\otimes[c,b]$

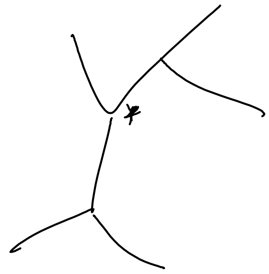


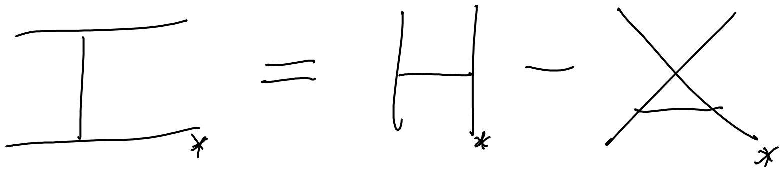
$a\otimes[b,c] + b\otimes[c,a] + c\otimes[a,b]$

Now localized.

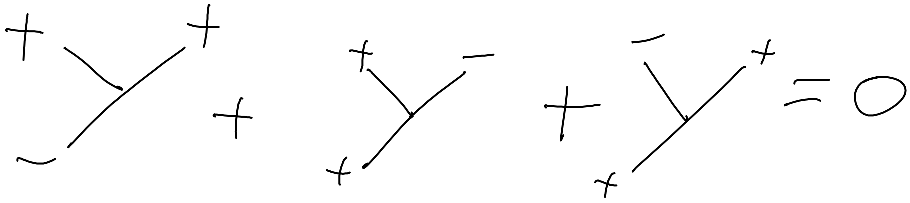
one arrow

Claim $\underbrace{\mathcal{A}^{1a}_{\text{trees}}/\mathcal{A}_{\text{trees}} \to \mathrm{tder}}_{\text{rough}}$





$\Downarrow ?$



$\Rightarrow$ To get IHX on the nose, τ would have to "average" ends, not just add them.