① The LRR

② The differential is t_V

③ t_V is a cx

④ t_V is exact

① LRR If λ, μ are p

$$L_\lambda^V \otimes L_\mu^V = \sum_{|\nu| = |\lambda| + |\mu|} L_\nu V^{LR(\lambda,\nu;\mu)}$$

Where $LR(\lambda,\nu;\mu)$ is obtained as follows.

Draw ν, remove λ. Fill in the 1.1 as ν_1 ones ν_2 twos etc.

Rows weakly inc

Cols strict inc

The resulting word (reading right to left, top to bottom) must be a lattice perm

$w = a_1 a_2 \dots a_N$ in $\{1, \dots, n\}$

s.t. $\forall r$ $1 \le r \le N$ $\forall$ $1 \le i \le n-1$ the $a_1 \dots a_r$ must cont at least as many i's as $i+1$'s.

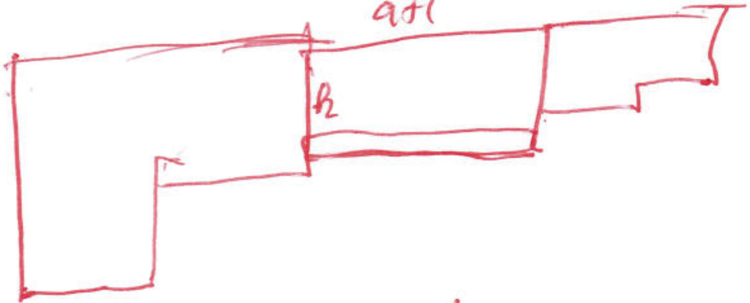
② acyclic $\exists!\; L'_{\phi(\nu,k)} \longrightarrow L_{a+1} \otimes L'_{\phi(\nu,k-1)}$

where $\nu = \nu_1 \dots \nu_i (k-1)^a \nu_j \dots$

$\nu_i \ge k$

$k-2 \ge \nu_j$

$$L'_{(\alpha\, k^{a+1} \beta)} \longrightarrow L_{a+1} \otimes L'_{\alpha (k-1)^{a+1} \beta}$$



Draw $\mathcal{P}(\nu,k)'$ Rc $\mathcal{P}(\nu,k-1)'$

we are left with (1 [a+1])

$\exists!$ to fill this in w/ $a+1$ 0's

r, c, w all OK.

(2) $a \| /2$ 2nd LR Thec.

$\nu = \nu_1 \ldots \nu_t (k-1)^a (k-2)^b \nu_h \ldots$

Then $t_{\nu,k} \to t_{\nu,k-1} \to t_{\nu,k-2}$ (1)

factors through

$L_{\mathcal{P}(\nu,k)'} \longrightarrow L_{a+b+2} \otimes L_{\mathcal{P}(\nu,k-1)'}$ (2)

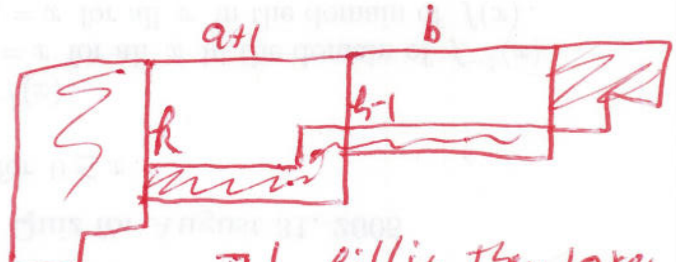
But LR says (2) is 0 $\therefore$ (1) is zero

Look at (2)

$\mathcal{P}(\nu,k) = \cancel{\nu_1 \ldots \nu} \alpha \; k^{a+1}(k-1)^b \beta$

$\mathcal{P}(\nu,k-1) = \alpha \; (k-1)^a (k-2)^{b+1} \beta$

Draw $\mathcal{P}(\nu,t)'$



$\exists!$ fill in these boxes w/ $a+b+2$ k's with st. like cols.

Rem $\mathcal{P}(\nu,k-2)$

④ Appl 3 of LR

t_ν is exact

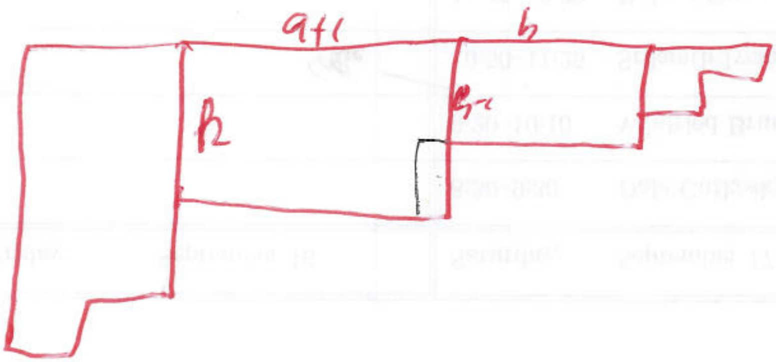
① St ~~prove~~ t_ν is exact wh $\phi: F \to G$ is the identity map.

② St

$$L_M \otimes \underbrace{L_{\phi(\nu,k)}'}_{\alpha\, k^{a+1}(k-1)^{b}\beta} \to L_{M+a+1} \otimes \underbrace{L_{\phi(\nu,k-1)}'}_{\alpha (k-1)^{a+b+1}\beta} \to L_{M+a+b+2} \otimes \underbrace{L_{\phi(\nu,k-2)}'}_{\alpha (k-1)^{a}(k-2)^{b+1}\beta} \text{ ex}$$

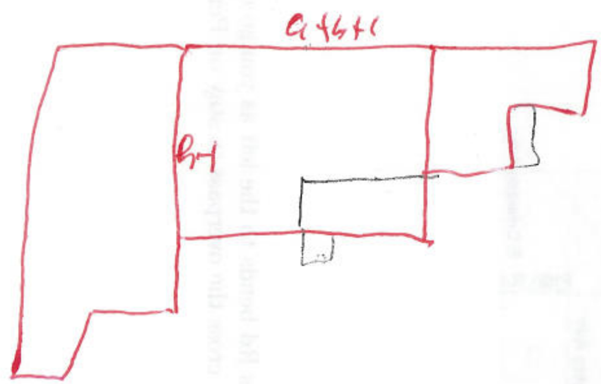
where the map is either 0 or id on each irred rep

The irred reps of LH red a_r

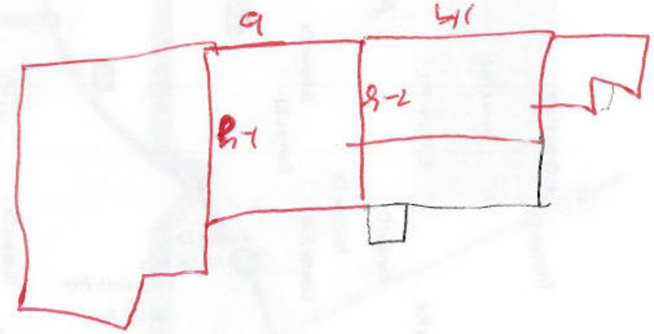


Adjoin M boxes, nec 2 is necessary

Cpe



Adjoin m+a+1 boxes
need 2 intersec
case



adjoin m+a+b+2 bxs
need 2 intersec case