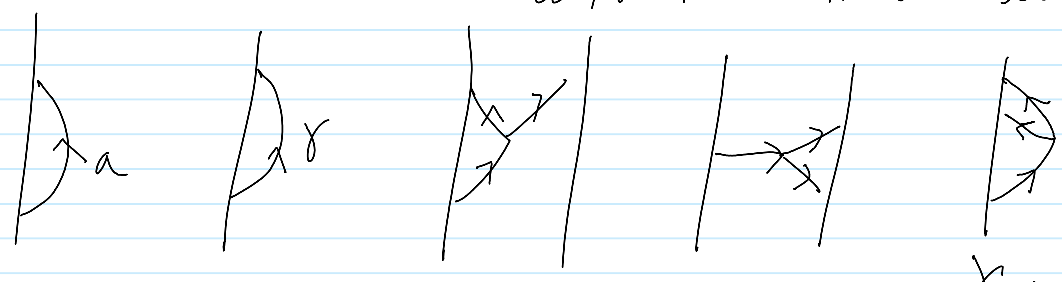
# The missing primitives

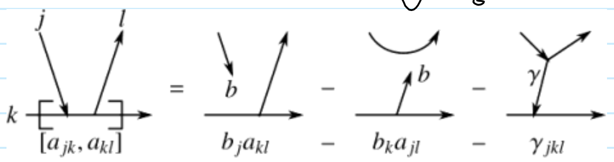
June-02-15 4:44 AM

Convention: head above tails.




$a_{ii}$ $\gamma_{ii}$ $\gamma_{iij}$ $\gamma_{ijj}$ $\gamma_{iii}$

Are these enough?




$[a_{jk}, a_{jl}] = c_l a_{jk} - c_k a_{jl} =: \gamma_{jkl}$,

$[a_{jk}, a_{ik}] = b_i a_{jk} - b_j a_{ik}$,

$[a_{jk}, a_{kl}] = b_j a_{kl} - b_k a_{jl} - \gamma_{jkl}$,

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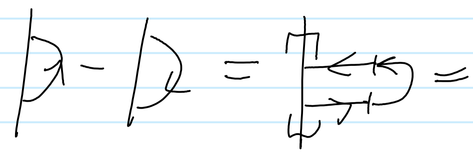
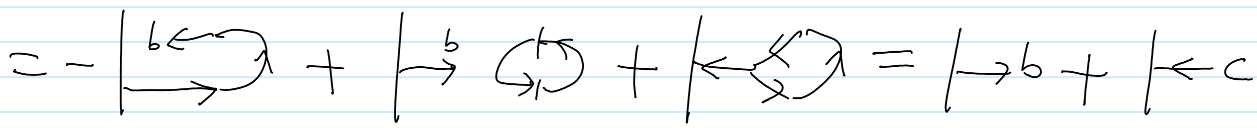
$a_{j_1j_2} - a_{j_2j_1} =$ 

$\parallel$

$a_{jj}$




So $a_{j_1j_2} = a_{jj} + b_j + c_j$

it seems that all is well if $b_j + c_j$ is added to the game, but $b_j + c_j$ is not co-homogeneous.

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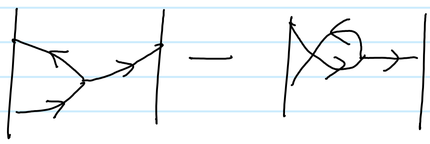 $= \gamma_{j_1kj_2} - \gamma_{j_2kj_1} =$

$= c_{j_2} a_{j_1k} - c_k a_{j_1j_2} - c_{j_1} a_{j_2k} + c_k a_{j_2j_1} =$

$= [a_{jk}, c_j] - c_k(b_j + c_j) = -\gamma_{jk} - b_j c_k = -\delta a_{jk}$

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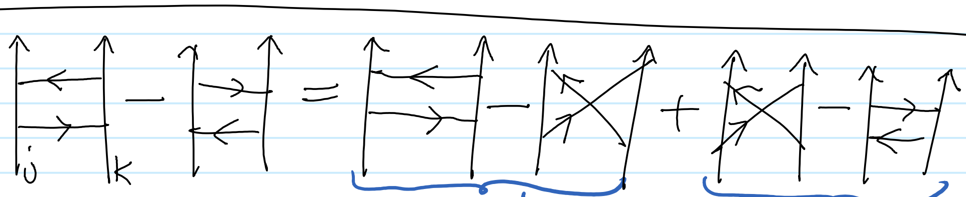
$[a_{jk}, a_{kj}] =$ 


1 [ ] on k

2 [ ] on j

$$① = b_j a_{kj} - b_k a_{j_1 j_2} - \gamma_{j_1 k j_2} =$$

$$= b_j a_{kj} - b_k a_{jj} - b_k(b_j + c_j) - \gamma_{j_1 k j_2}$$

$$= \underline{b_j a_{kj}} - \underline{b_k a_{jj}} - b_k(\cancel{b_j} + \cancel{c_j}) - \underline{\gamma_{jkj}} + \underline{\gamma_{jk}} + \cancel{b_j c_k}$$

$$② = -b_k a_{jk} + b_j a_{k_1 k_2} + \gamma_{k_1 j k_2}$$

$$= \underline{-b_k a_{jk}} + \underline{b_j a_{kk}} + b_j(\cancel{b_k} + \cancel{c_k}) + \underline{\gamma_{kjk}} - \underline{\gamma_{kj}} - \cancel{b_k c_j}$$

So over all,

$$[a_{jk}, a_{kj}] = ① + ② =$$

$$= b_j a_{kj} - b_k a_{jk} + b_j a_{kk} - b_k a_{jj} + \gamma_{kjk} - \gamma_{jkj}$$
$$+ \gamma_{jk} - \gamma_{kj} - 2 b_k c_j + 2 b_j c_k$$

Redo at a-c level!