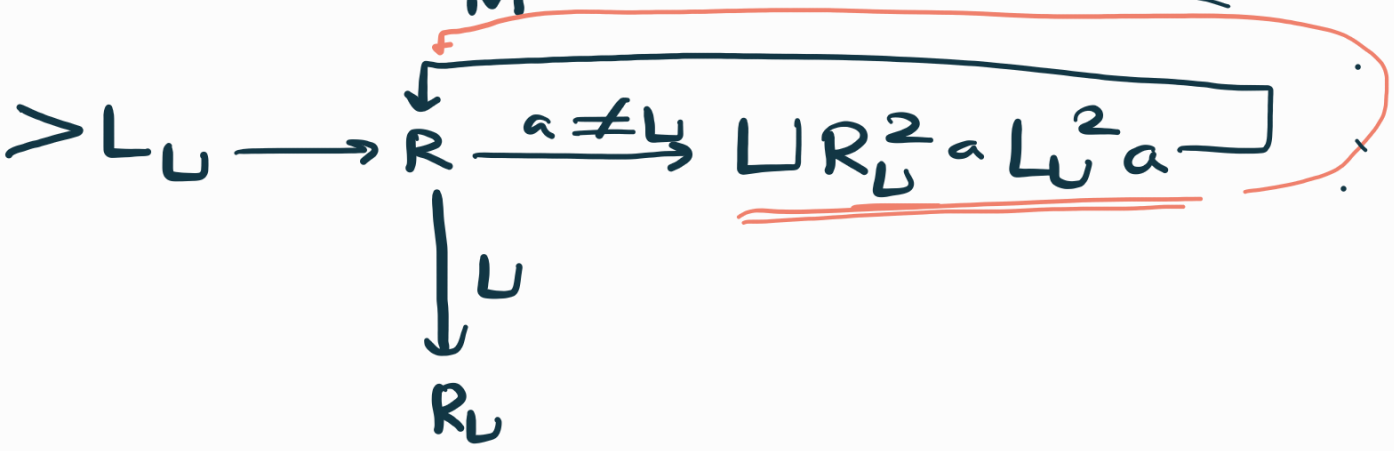
$\sqcup ab\underline{\sqcup} \vdash^{n}_{M} \sqcup ab\sqcup ab\underline{\sqcup}$



$\sqcup ab\underline{\sqcup} \vdash \underline{\sqcup} ab\sqcup$ ($\because L_\sqcup$)

$\vdash \sqcup \underline{a}b\sqcup$ ($\because R$)

$\vdash \sqcup\sqcup b\sqcup$ (copy a)

$\vdash \sqcup\sqcup b\sqcup\underline{\sqcup}$ ($R_\sqcup^2$)

$\vdash \sqcup\sqcup b\sqcup\underline{a}$ (paste a)

$\vdash \sqcup\underline{\sqcup} b\sqcup a$ ($L_\sqcup^2$)

$\vdash \sqcup\underline{a}b\sqcup a$ (paste a)

$\vdash \sqcup a\underline{b}\sqcup a$ (R)

$\vdash \sqcup a\underline{\sqcup}\sqcup a$ (copy b)

$\vdash \sqcup a\sqcup\sqcup a\underline{\sqcup}$ ($R_\sqcup^2$)

$\vdash \sqcup a\sqcup\sqcup a\underline{b}$ (paste b)

$\vdash$ ␣ a ␣ ␣ ab $(L_{␣}^{2})$

$\vdash$ ␣ a b ␣ ab (paste b)

$\vdash$ ␣ a b ␣ a b (R)

$\vdash$ ␣ a b ␣ a b ␣ $(R_{␣})$

Ques: Right – Shifting TM TM → ✓ 2 times

␣ w ␣ $\vdash$ ␣ ␣ w ␣

Where w contains no blank characters.

␣ w ␣ $\vdash$ ␣ w ␣ (L)

$\vdash$ ␣ w ␣ (copy 'w')

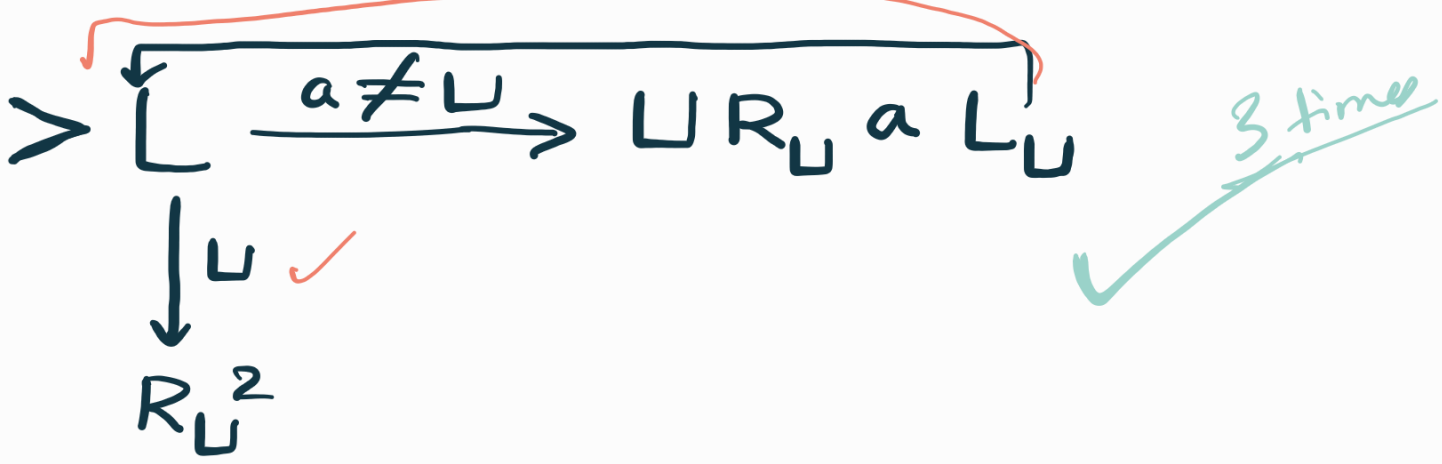
$\vdash$ ␣ ␣ ␣ $(R_{␣})$

$\vdash$ ␣ ␣ w (paste 'w')

$\vdash$ ␣ ␣ w $(L_{␣})$

$\vdash$ ␣ ␣ w (L) ✓

$\vdash$ ␣ ␣ w ␣ $(R_{␣}^{2})$



␣ a b ␣ ⊢ ␣ ␣ a b ␣ ✓

␣ a b ␣ ⊢ ␣ a b ␣ (L)

⊢ ␣ a ␣ ␣ (copy b)

⊢ ␣ a ␣ ␣ (R␣)

⊢ ␣ a ␣ b (paste 'b')

⊢ ␣ a ␣ b (L␣)

⊢ ␣ a ␣ b (L)

⊢ ␣ ␣ ␣ b (copy a)

⊢ ␣ ␣ ␣ b (R␣)

⊢ ␣ ␣ a b (paste a)

⊢ ␣ ␣ a b (L␣)

⊢ ␣ ␣ a b (L)

⊢ ␣ ␣ a b ␣ (R␣²)

Ques: Left – Shifting TM

w → $\sqcup \in w$

$\sqcup ab \sqcup \vdash ab \sqcup$

$\sqcup ab \sqcup \vdash \sqcup ab \sqcup \quad (L_\sqcup)$

$\vdash \sqcup ab \sqcup \quad (R)$

$\vdash \sqcup \sqcup b \sqcup \quad (\text{copy 'a'})$

$\vdash \sqcup \sqcup b \sqcup \quad (L)$

$\vdash a \sqcup b \sqcup \quad (\text{paste 'a'})$

$\vdash a \sqcup b \sqcup \quad (R)$

$\vdash a \sqcup b \sqcup \quad (R)$

$\vdash a \sqcup \sqcup \sqcup \quad (\text{copy 'b'})$

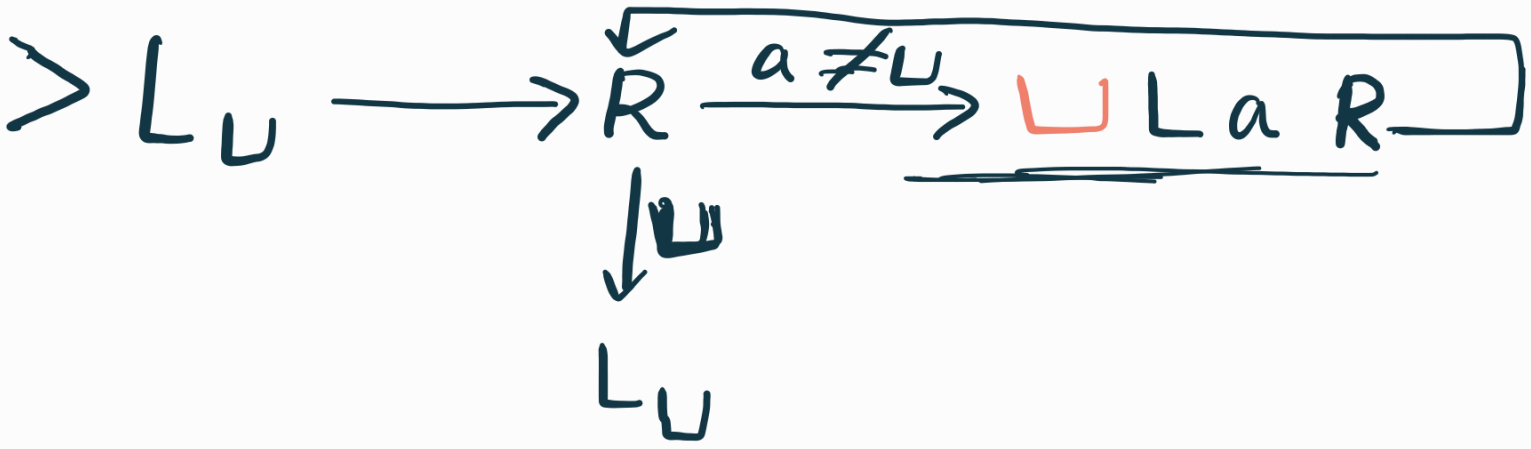
$\vdash a \sqcup \sqcup \sqcup \quad (L)$

$\vdash a b \sqcup \sqcup \quad (\text{paste 'b'})$

$\vdash a b \sqcup \sqcup \quad (R)$

$\vdash a b \sqcup \sqcup \quad (R)$

$\vdash a b \sqcup \quad (L_\sqcup)$


> L␣
R
a ≠ ␣
␣ L a R
␣
L␣