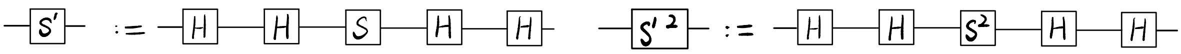
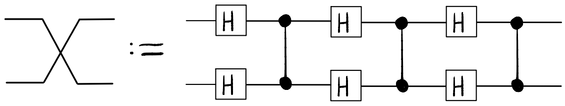
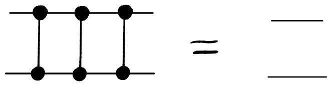
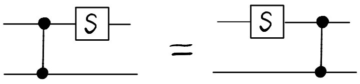
Two-Qutrit Derived Relations : T_2

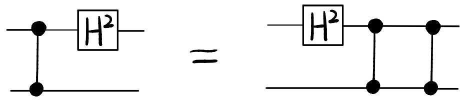
Def 1 : 

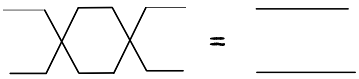
Def 2 : 

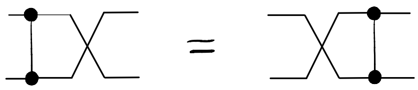
Def 3 : 

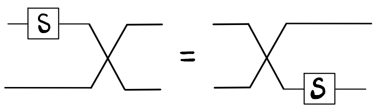
C_6 : 

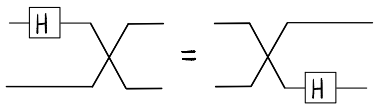
C_7 : 

C_8 : 

R_{16} : 

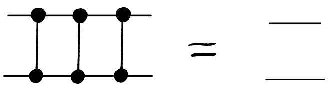
R_{17} : 

R_{18} : 

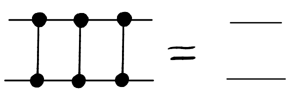
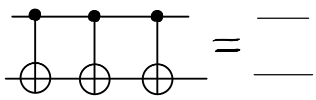
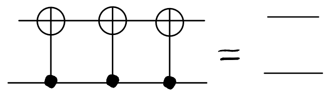
R_{19} : 

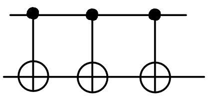
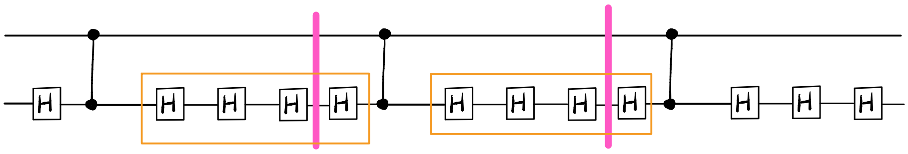
Def 2 : 

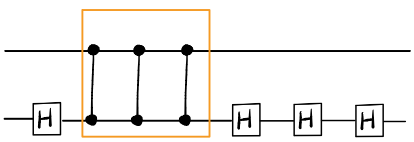
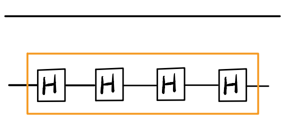
C_2 : $H^4 = I$

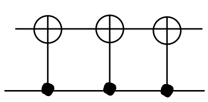
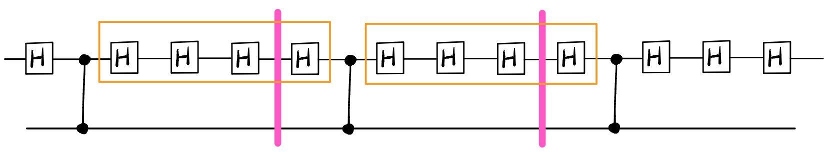
C_6 : 

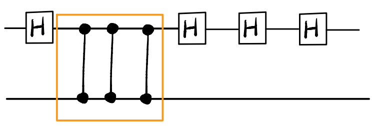
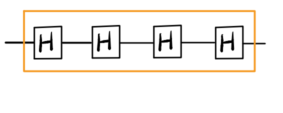
Lem G By Def 2, C_2 & C_6 ,

C_6 :  implies C_6^1 :  & C_6^2 : 

Proof: C_6^1 . LHS :=  $\underset{=}{\text{Def 2}}$ 

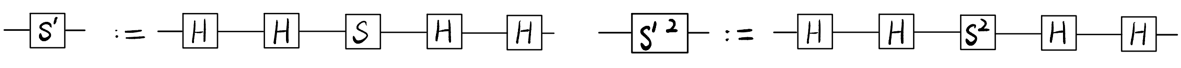
$\underset{=}{C_2}$  $\underset{=}{C_6}$  $\underset{=}{C_2}$ =: C_6^1 . RHS

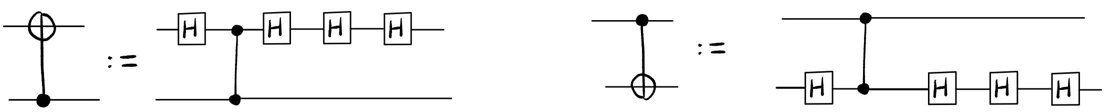
C_6^2 . LHS :=  $\underset{=}{\text{Def 2}}$ 

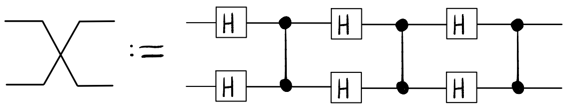
$\underset{=}{C_2}$  $\underset{=}{C_6}$  $\underset{=}{C_2}$ =: C_6^2 . RHS

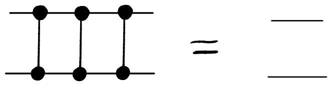
∎

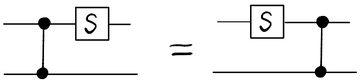
Two - Qutrit Derived Relations : T_2

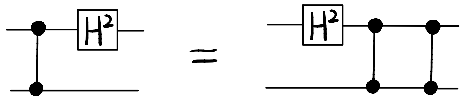
Def 1 : 

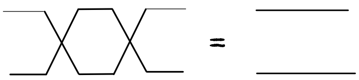
Def 2 : 

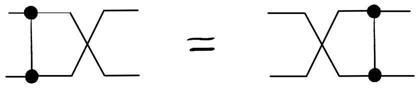
Def 3 : 

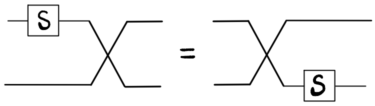
C_6 : 

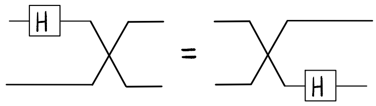
C_7 : 

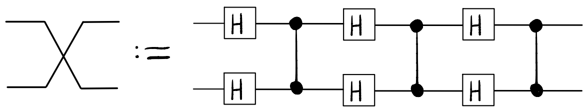
C_8 : 

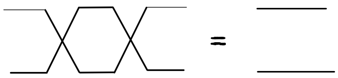
R_{16} : 

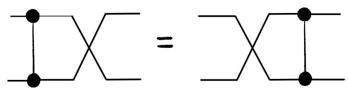
R_{17} : 

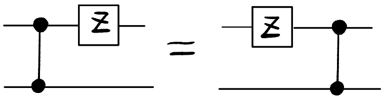
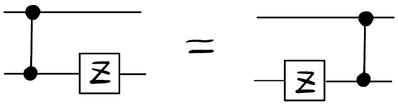
R_{18} : 

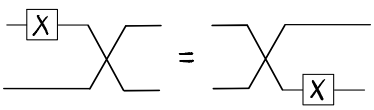
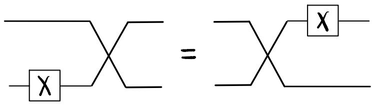
R_{19} : 

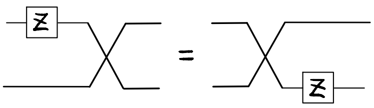
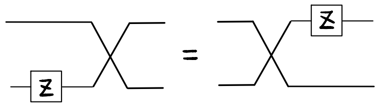
Def 3 : 

R_{16} : 

R_{17} : 

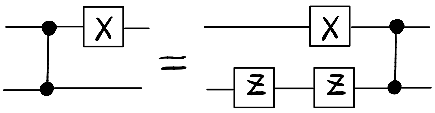
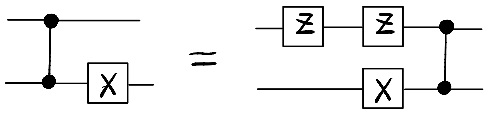
R_{13} : (1)  (2) 

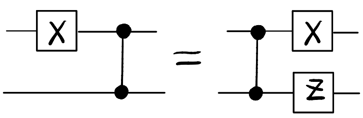
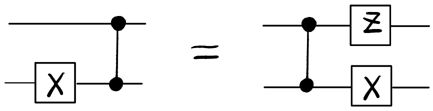
R_{20} : (1)  (2) 

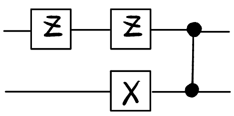
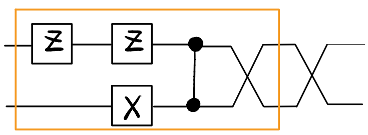
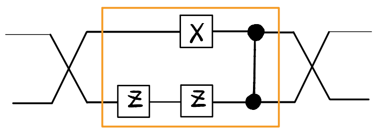
R_{21} : (1)  (2) 

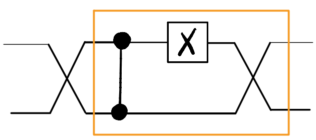
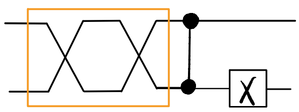
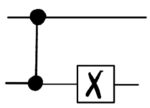
R_{12} : $Z^3 = I$

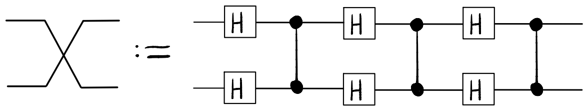
Lem H By Def 3 $R_{12}, R_{13}, R_{16}, R_{17}, R_{20}$ & R_{21},

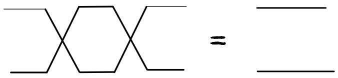
R_{14} : (1)  implies (2) 

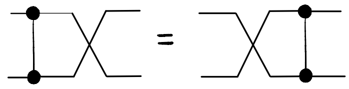
(3)  (4) 

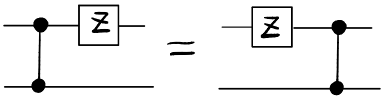
Proof: R_{14}.(2). RHS :=  $\overset{R_{16}}{=}$  $\overset{R_{17}, R_{20}}{\underset{R_{21}}{=}}$ 

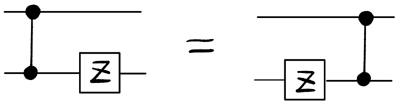
$\overset{R_{14}.(1)}{=}$  $\overset{R_{17}}{\underset{R_{20}}{=}}$  $\overset{R_{16}}{=}$  =: R_{14}.(2). LHS

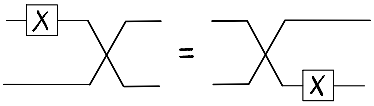
Def 3: 

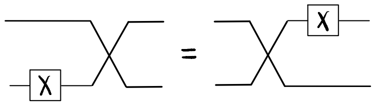
R_{16}: 

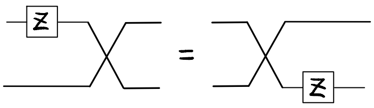
R_{17}: 

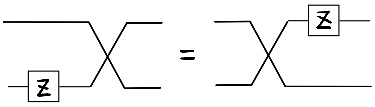
R_{13}: (1) 

(2) 

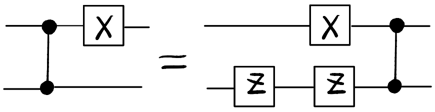
R_{20}: (1) 

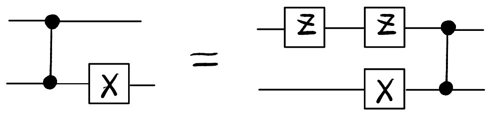
(2) 

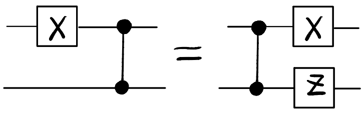
R_{21}: (1) 

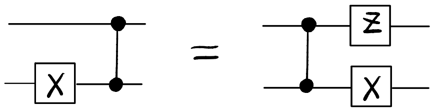
(2) 

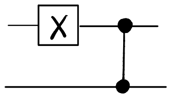
R_{12}: $Z^3 = I$

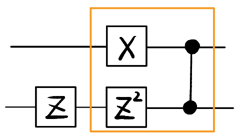
R_{14}: (1) 

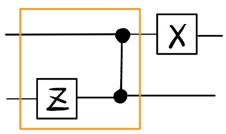
implies (2) 

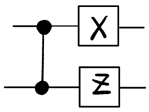
(3) 

(4) 

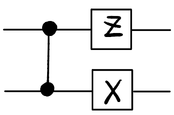
Proof cont. $R_{14}.(3).LHS :=$ 

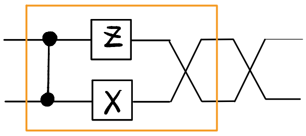
$\overset{R_{12}}{=\!=}$ 

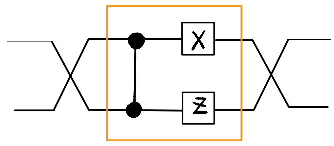
$\overset{R_{14}.(1)}{=\!=}$ 

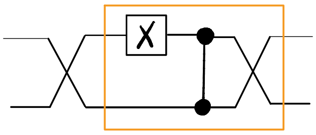
$\overset{R_{13}}{=\!=}$ 

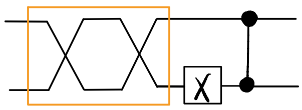
$=: R_{14}.(3).RHS.$

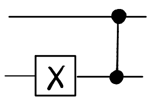
$R_{14}.(4).RHS :=$ 

$\overset{R_{16}}{=\!=}$ 

$\overset{R_{17}, R_{20}}{\underset{R_{21}}{=\!=}}$ 

$\overset{R_{14}.(3)}{=\!=}$ 

$\overset{R_{17}}{\underset{R_{20}}{=\!=}}$ 

$\overset{R_{16}}{=\!=}$ 

$=: R_{14}.(4).LHS$

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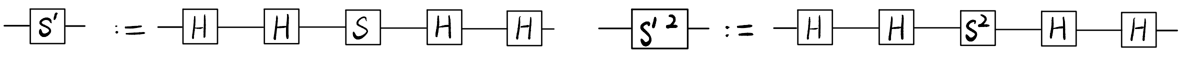
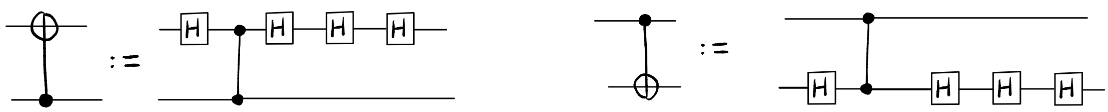
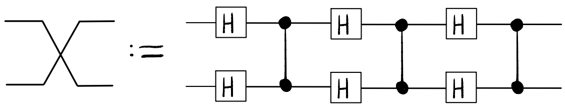
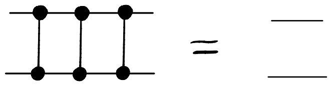
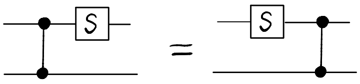
Two-Qutrit Derived Relations : T_2

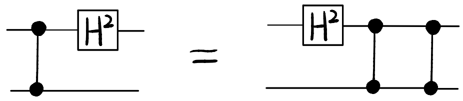
Def 1 : 

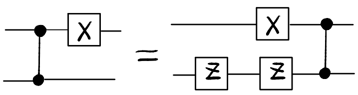
Def 2 : 

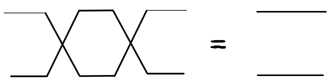
Def 3 : 

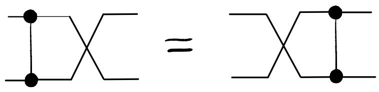
C_6 : 

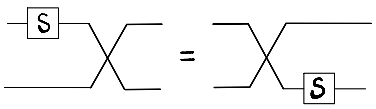
C_7 : 

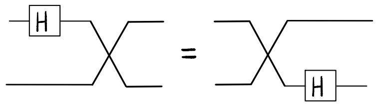
C_8 : 

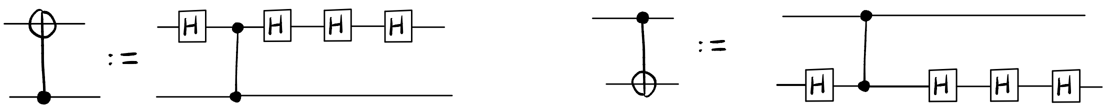
R_{14} : 

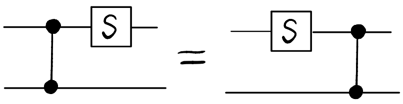
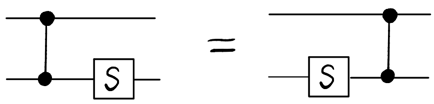
R_{16} : 

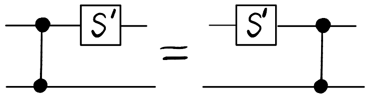
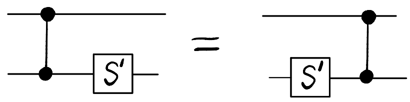
R_{17} : 

R_{18} : 

R_{19} : 

Def 2 : 

C_7 : (1)  (2) 

R_{15} : (1)  (2) 

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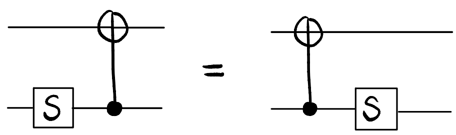
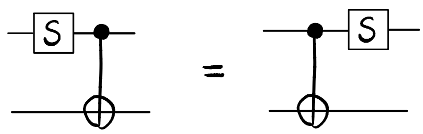
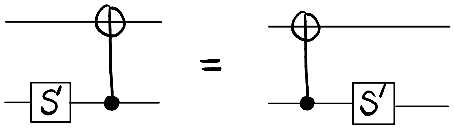
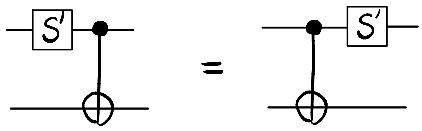
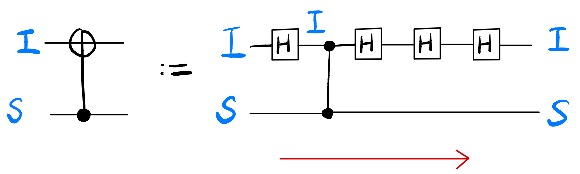
R_{24} : 

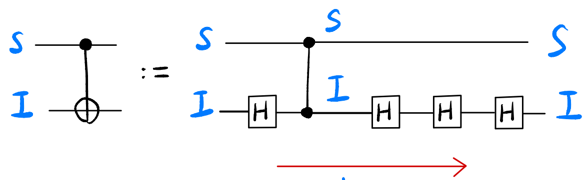
R_{24}^2 : 

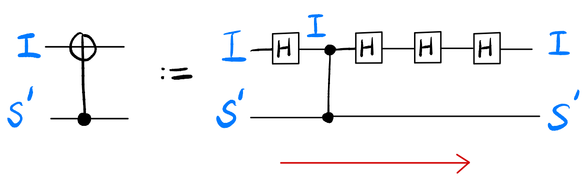
R_{24}^1 : 

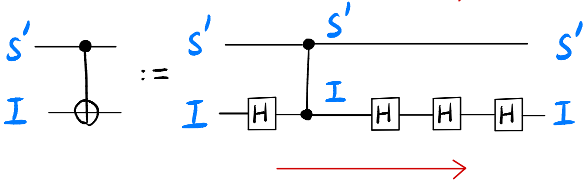
R_{24}^3 : 

Proof : By Def 2 , C_7 & R_{15},

R_{24} : 

R_{24}^2 : 

R_{24}^1 : 

R_{24}^3 : 

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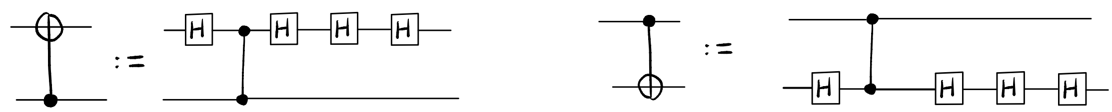
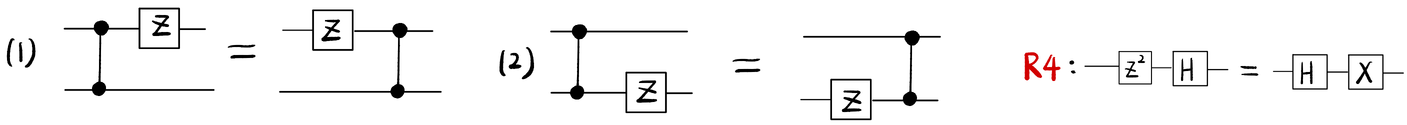
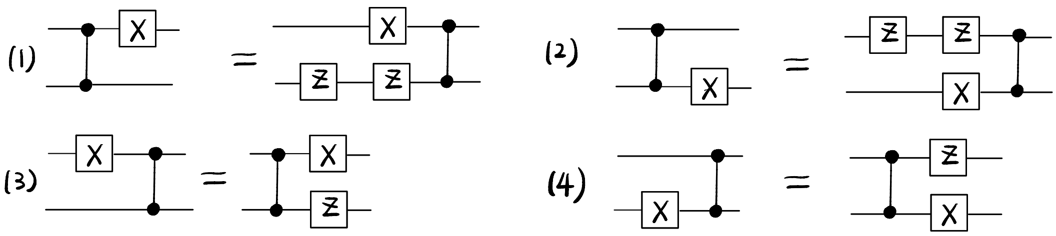
Def 2:



R_{13} : (1)



R_{14}:



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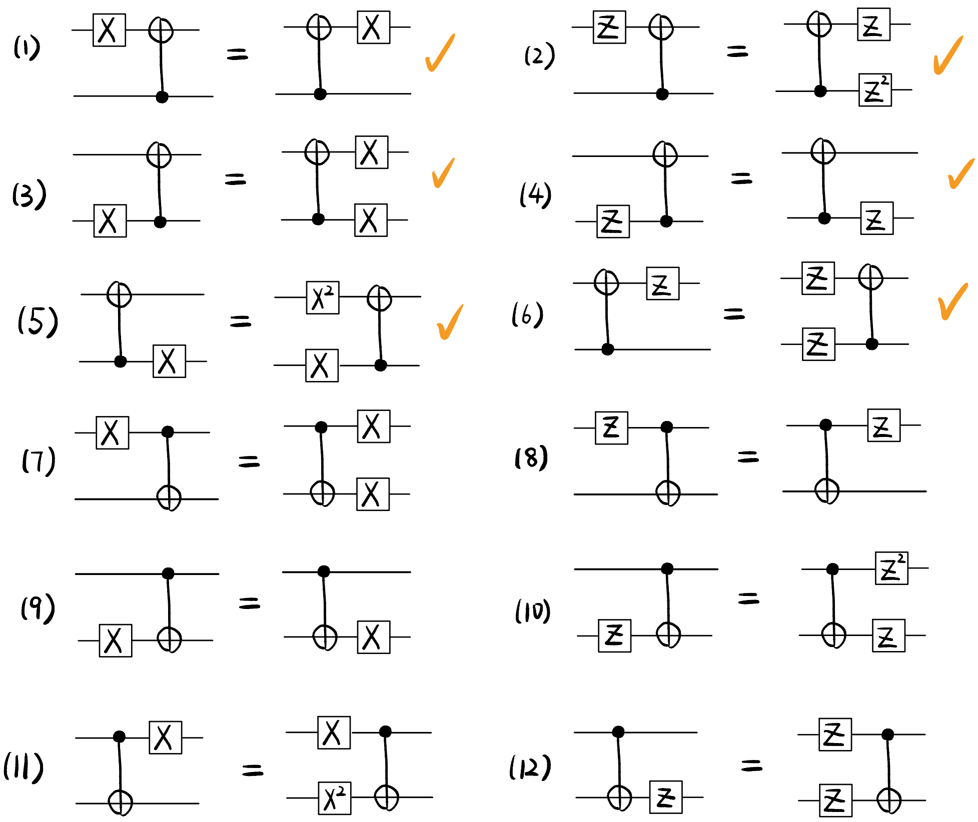
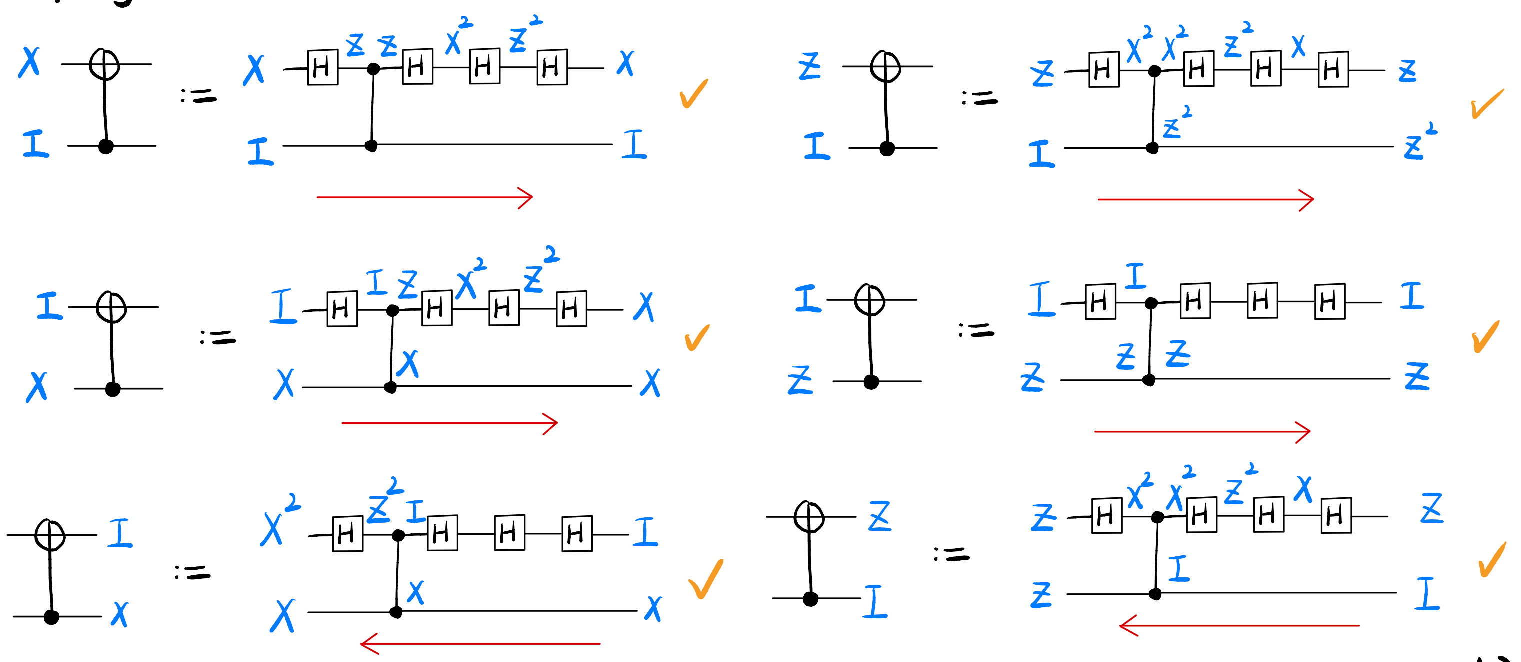
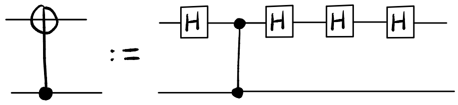
R_{26}:



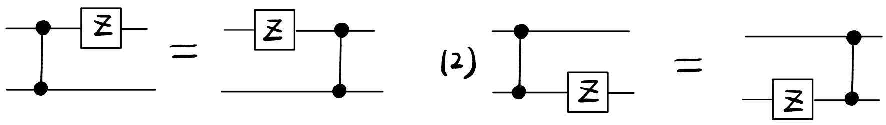
Proof: By Def 2, R_4, R_{13} & R_{14},



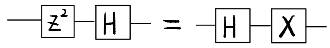
Def 2:



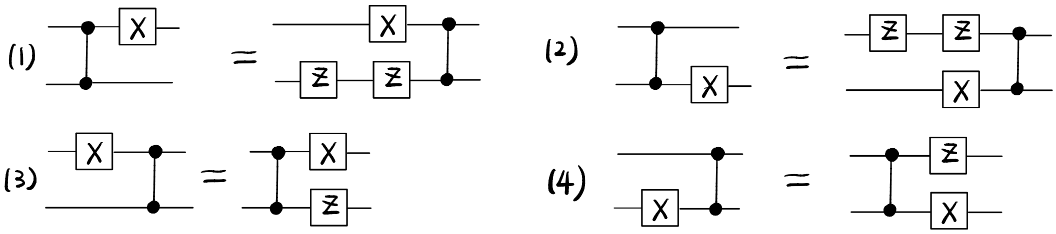
R_{13}:



R_4:



R_{14}:



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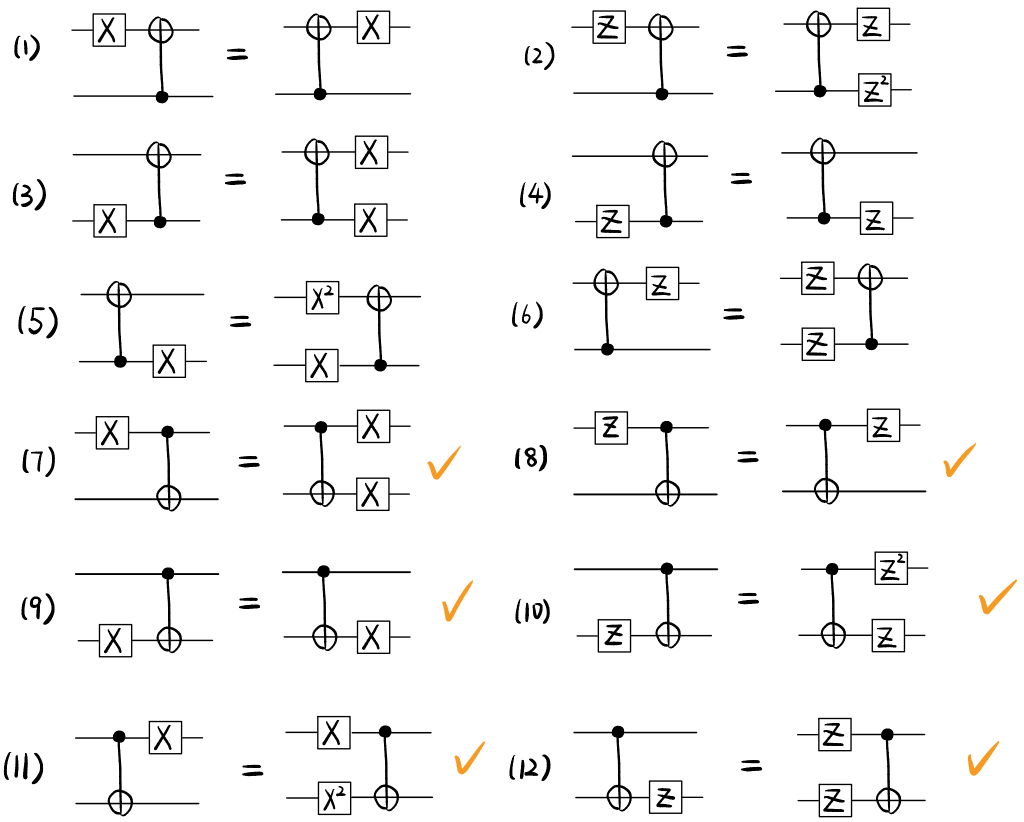
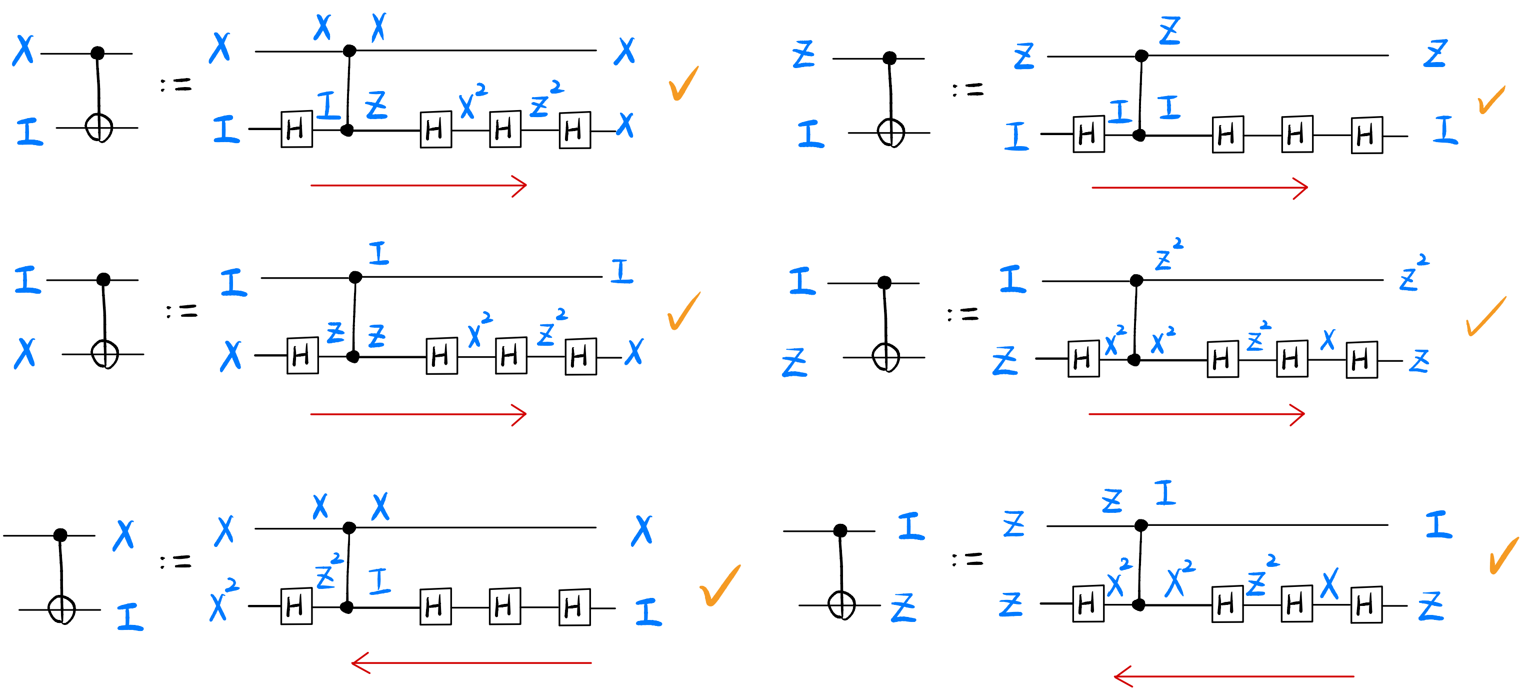
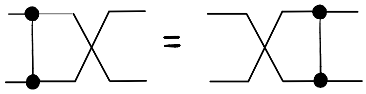
R_{26}:

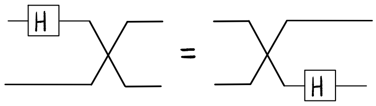
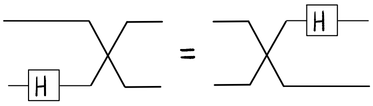


Proof cont.

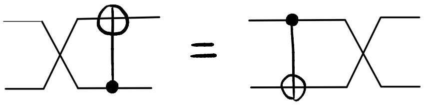
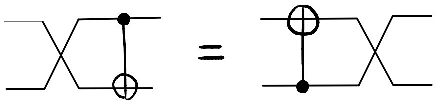


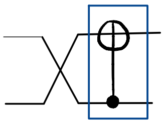
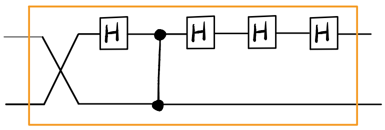
Def 2: 

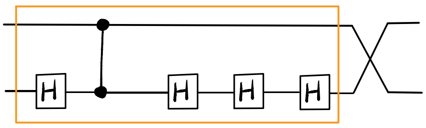
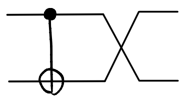
R_{17}: 

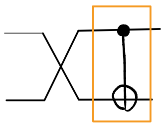
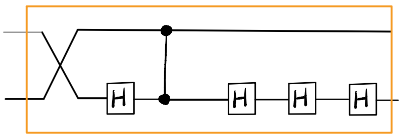
R_{19}: (1)  (2) 

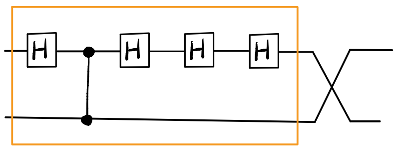
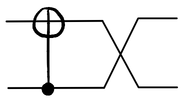
Lem K By Def 2, R_{17} & R_{19},

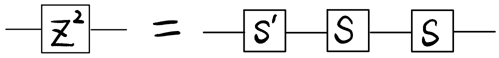
R_{31}: (1)  (2) 

Proof: R_{31}.(1). LHS :=  $\overset{\text{Def 2}}{=\!=}$ 

$\overset{R_{17}}{\underset{R_{19}}{=\!=}}$  $\overset{\text{Def 2}}{=\!=}$  =: R_{31}.(1). RHS

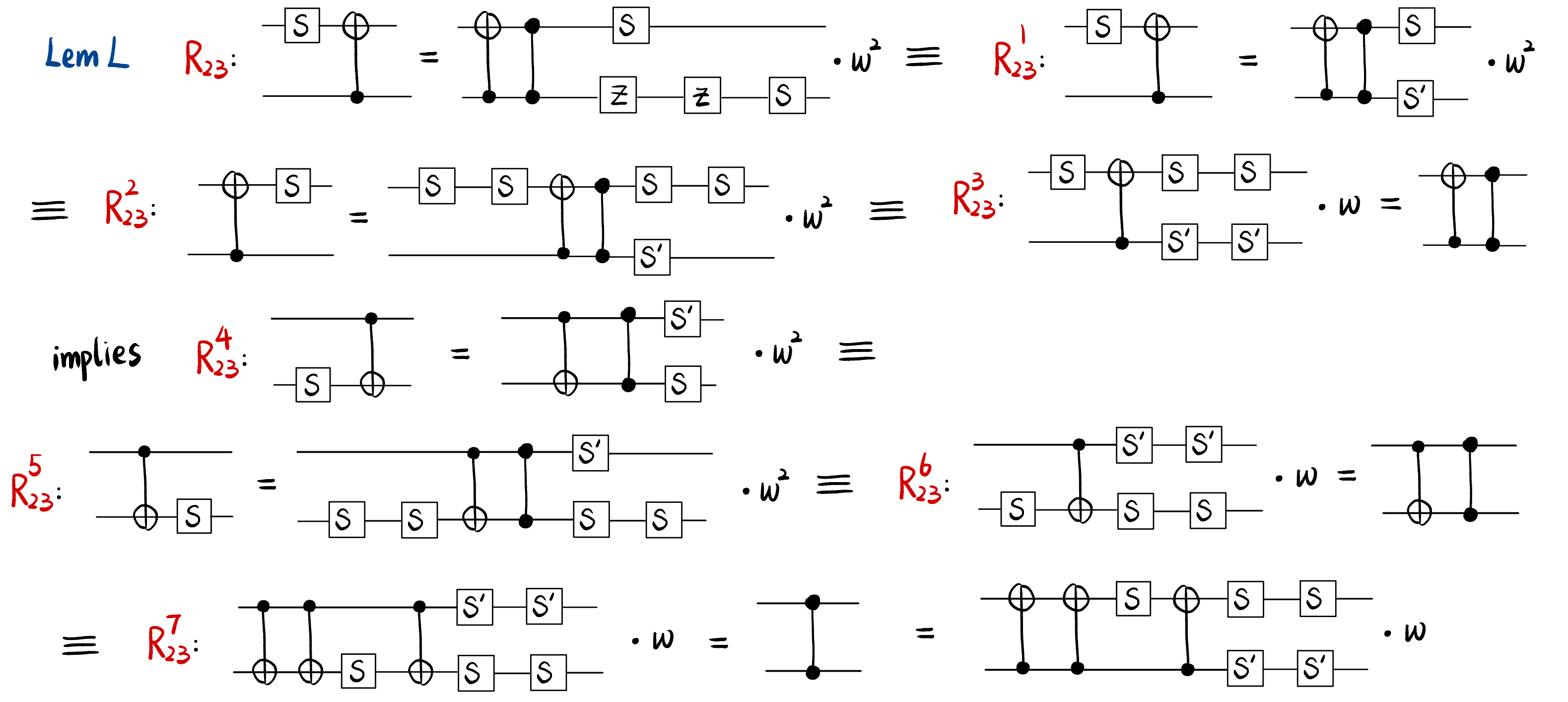
R_{31}.(2). LHS :=  $\overset{\text{Def 2}}{=\!=}$ 

$\overset{R_{17}}{\underset{R_{19}}{=\!=}}$  $\overset{\text{Def 2}}{=\!=}$  =: R_{31}.(2). RHS ∎

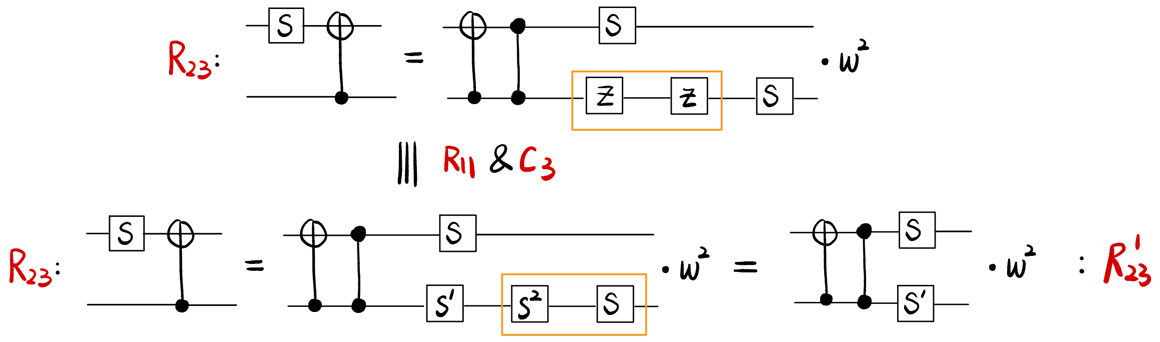
C1: $w^3 = 1$ C2: $H^4 = I$ C3: $S^3 = I$ R11: 

Def 2: 

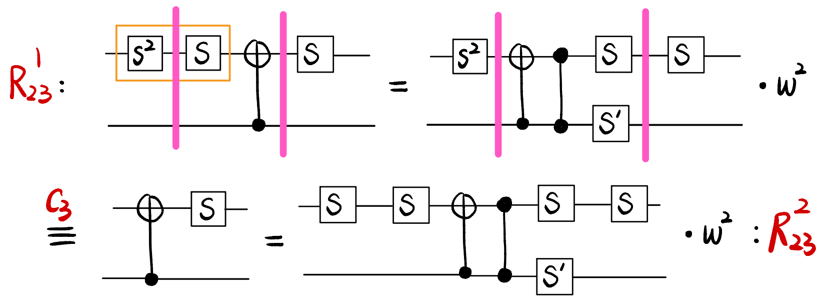
Lem L



Proof:



For both sides of R^1_{23}, left-appending them by $S^2 \otimes I$ and right-appending them by $S \otimes I$ yields



For both sides of R^1_{23}, right-appending them by $S^2 \otimes S'^2$ and multiplying them by w yields