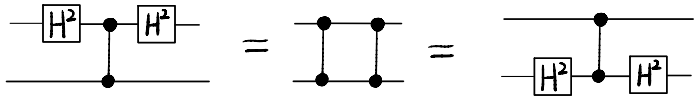
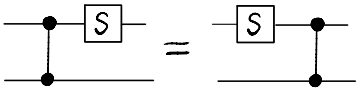
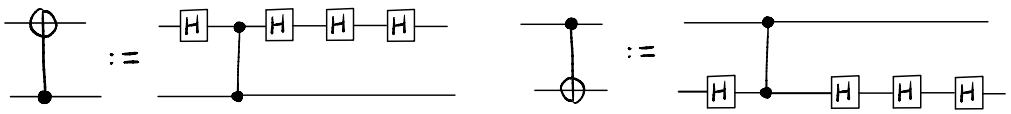
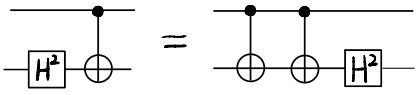
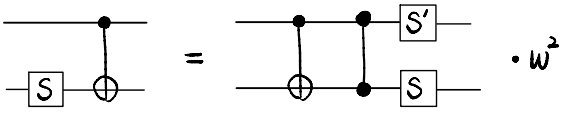
C_8^4: 

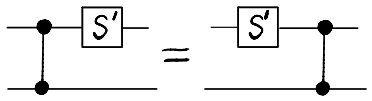
C_7: 

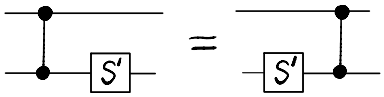
C1: $w^3 = 1$

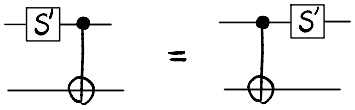
Def 2: 

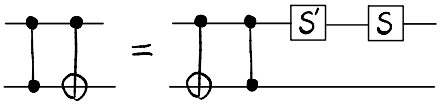
C_8^8: 

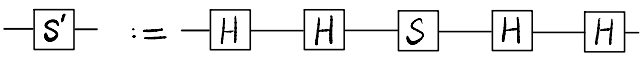
R_{23}^4: 

R_{15}: (1) 

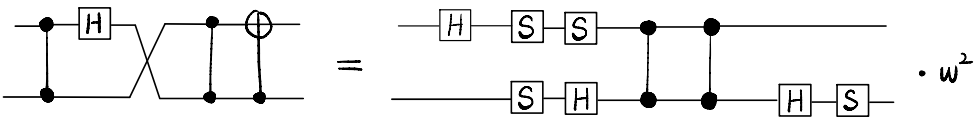
(2) 

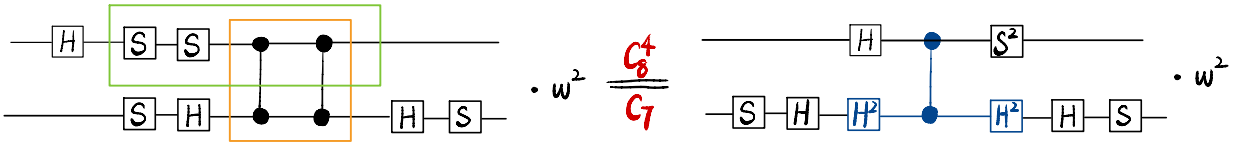
R_{24}^3: 

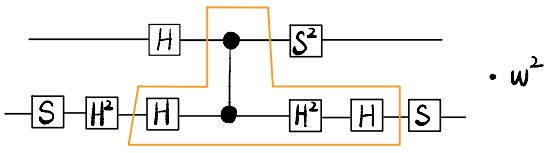
R_{25}^3: 

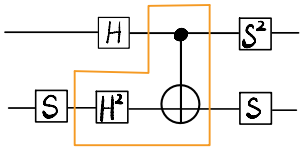
Def 1: 

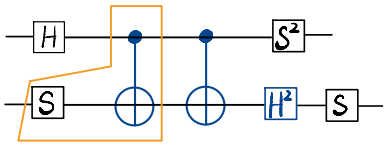
Lem U Def 1-3, C1-8, R_{15}, R_{23}, R_{24} & R_{25} imply

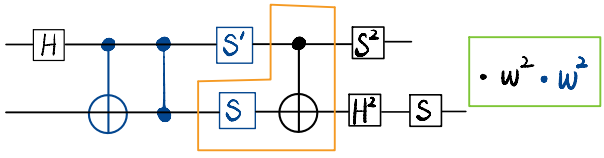
R_{29}: 

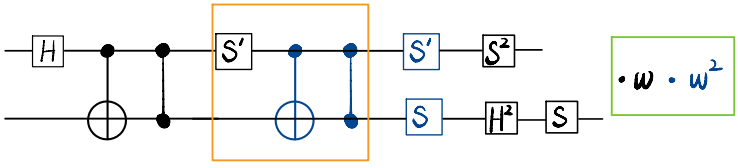
Proof: R_{29}.RHS := 

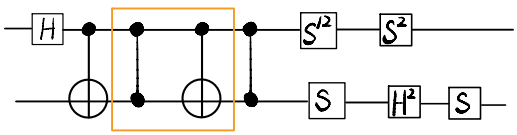
$= $ 

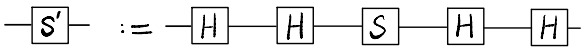
Def 2 

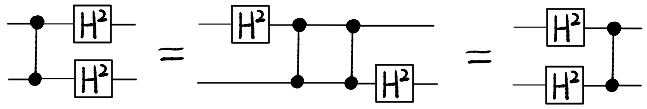
C_8^8 

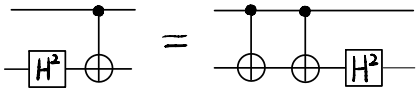
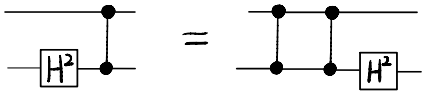
R_{23}^4 

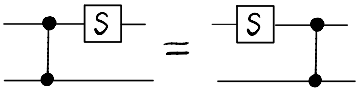
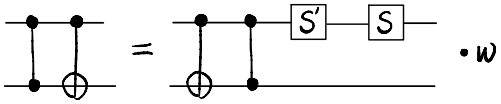
R_{23}^4 / C_1 

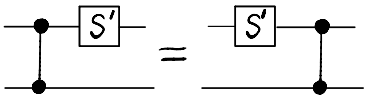
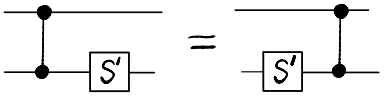
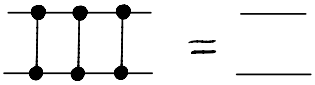
R_{15}, R_{23}^4 / C_1 

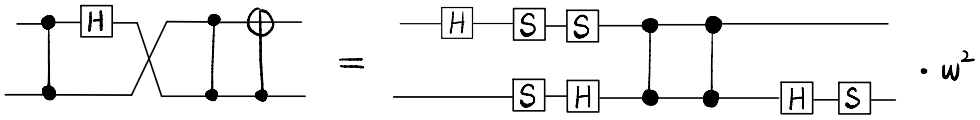
Def 1 :  C1: $w^3 = 1$ C2: $H^4 = I$ C3: $S^3 = I$

C_8^3:  C5: $SS' = S'S$

C_8^8:  C_8^1: 

C_7:  R_{25}^3: 

R_{15}: (1)  (2)  C_6: 

Lem U R_{29}: 

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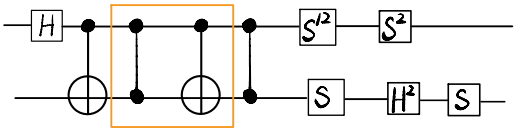
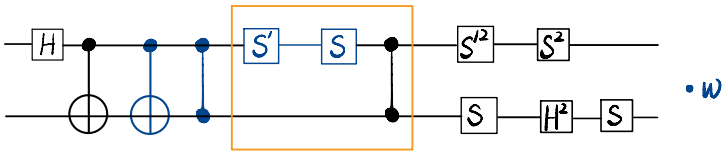
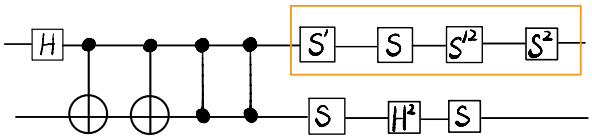
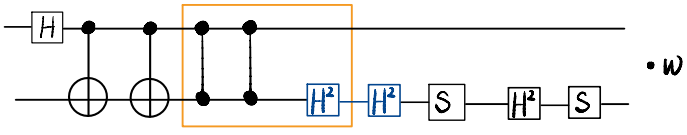
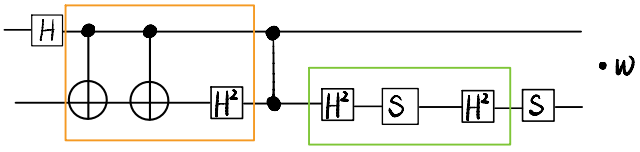
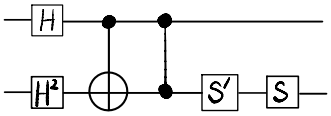


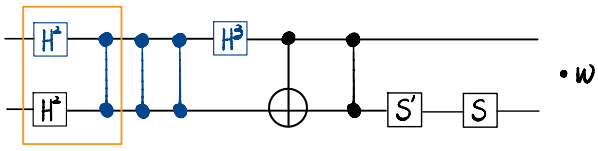
R_{25}^3 

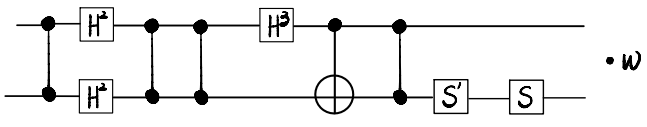
C_7 / R_{15} 

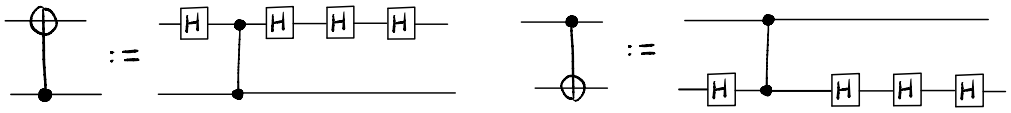
C_2, C_3, C_5 / Def 1 

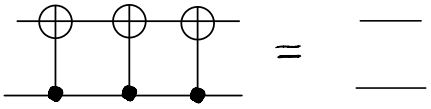
C_8^1 

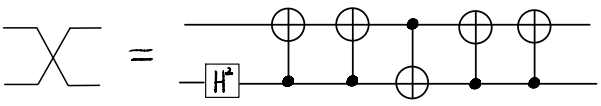
C_8^8 / Def 1 

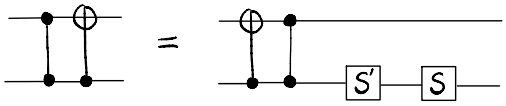
C_6 / C_2 

C_8^3 

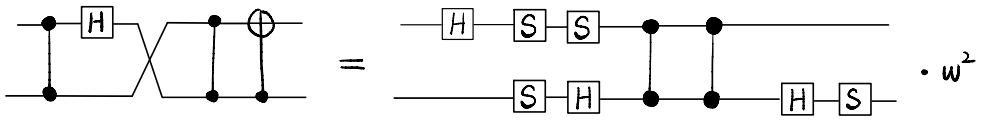
Def 2: 

C_6^2: 

Def 7: 

R_{25}^1: 

Lem 4

R_{29}: 

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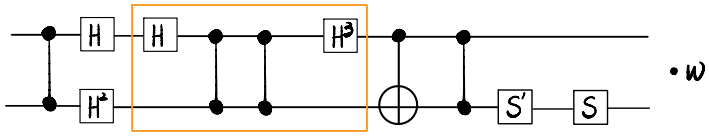
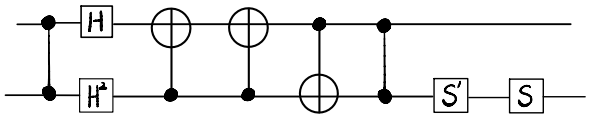
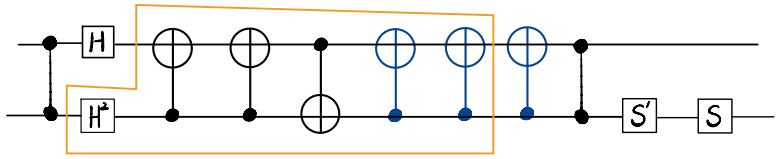


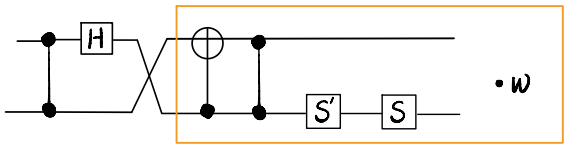
Def 2



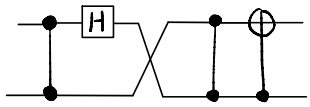
C_6^2



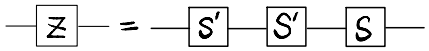
Def 7

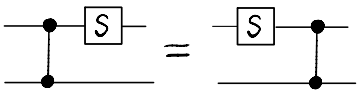


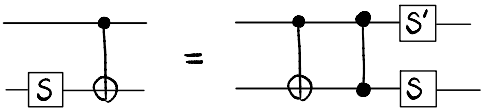
R_{25}^1

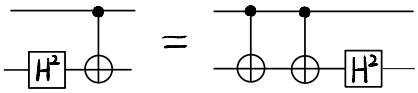


=: R_{29}. LHS.

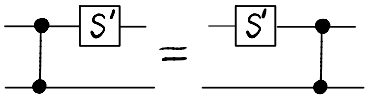
R10: 

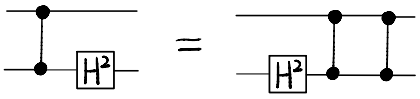
C5: $SS' = S'S$ C3: $S^3 = I$ C7: 

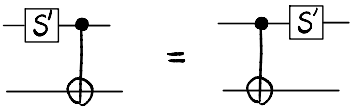
R_{23}^4: 

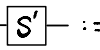
C_8^8: 

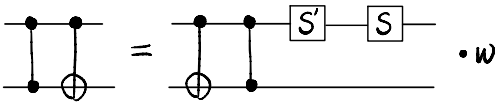
C1: $w^3 = 1$ C2: $H^4 = I$

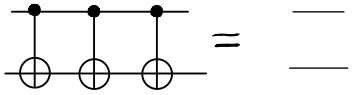
R15: 

C8: 

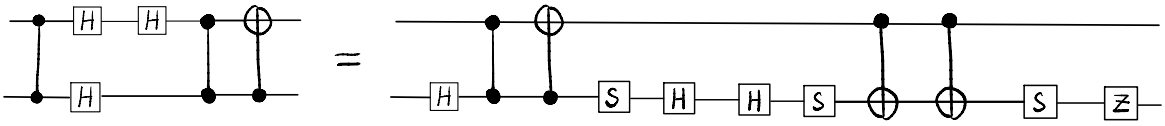
R_{24}^3: 

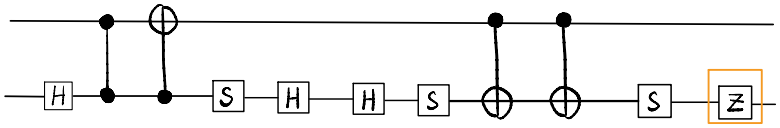
Def 1: 

$:= H^2SH^2$ R_{25}^3: 

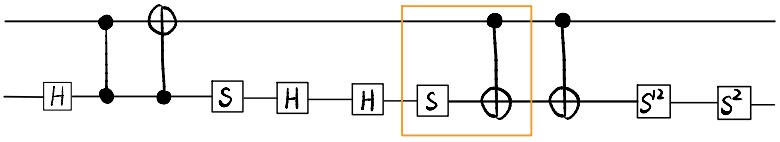
C_6^1: 

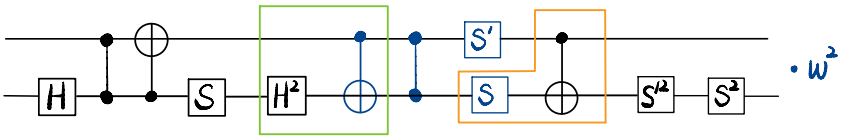
Lem V Def 1-3, C1-8, R15, R23, R24, R25 & R36 imply

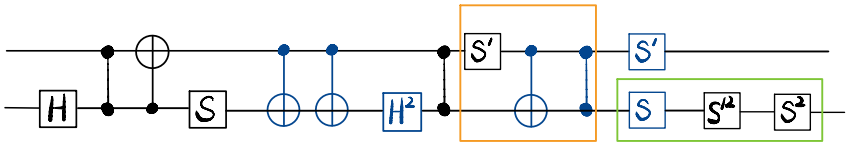
R_{30}: 

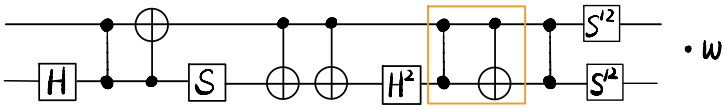
Proof: R_{30}. RHS := 

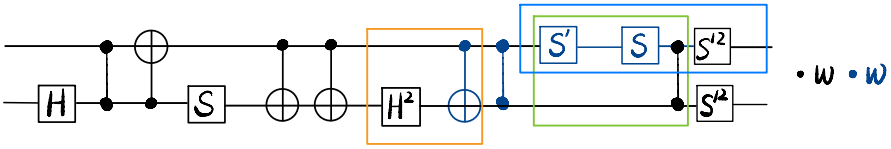
$SZ = S(S'^2S) \overset{C_5}{=} S'^2S^2$

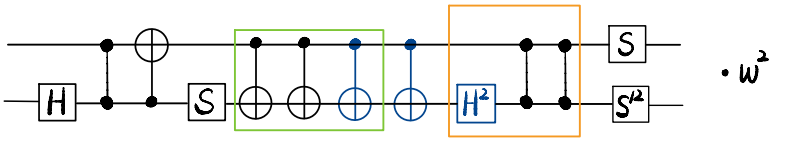
$\overset{R10}{\underset{C_5}{=}}$ 

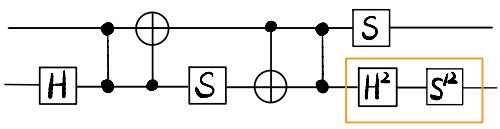
R_{23}^4 

$\overset{R_{23}^4}{\underset{C_8^8}{=}}$ 

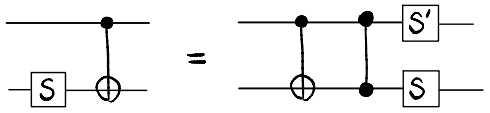
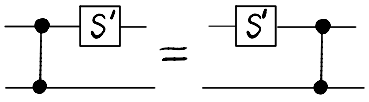
$\overset{C_1, C_3, C_5}{\underset{R_{15}, R_{24}^3}{=}}$ 

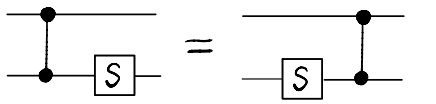
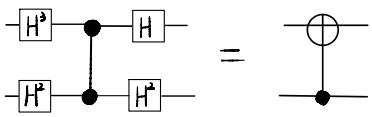
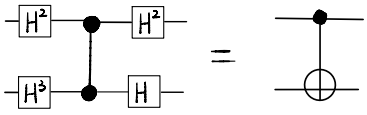
R_{25}^3 

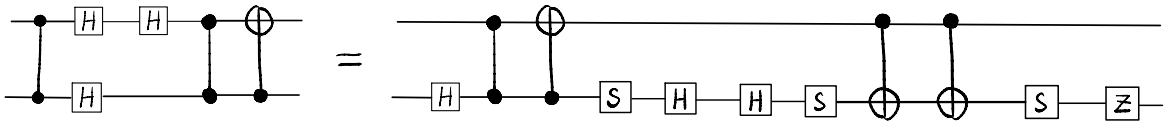
$\overset{C_5, C_7, C_8^8}{\underset{\text{Def 1}, C_2, C_3, R_{15}}{=}}$ 

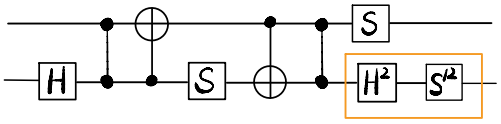
$\overset{C_8}{\underset{C_6^1}{=}}$ 

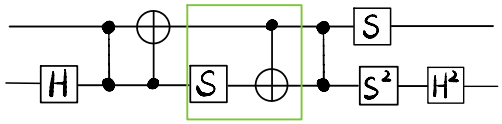
Def 1 :  $:= H^2SH^2$ C1: $w^3=1$ C2: $H^4=I$ C3: $S^3=I$ C5: $SS'=S'S$

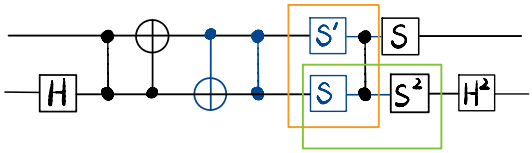
R_{23}^4:  $\cdot w^2$ R_{15}: 

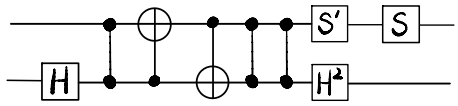
C7:  R_{32}^4:  R_{32}^3: 

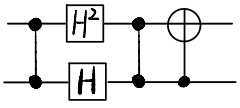
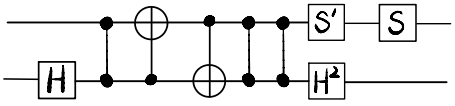
Lem V R_{30}: 

Proof cont.  $\cdot w^2$ H^2S^{12} $\overset{\text{Def 1}}{=}$ $H^2H^2S^2H^2 = S^2H^2$ $\overset{C_2}{=}$ S^2H^2

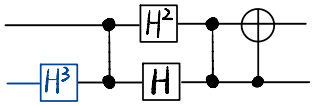
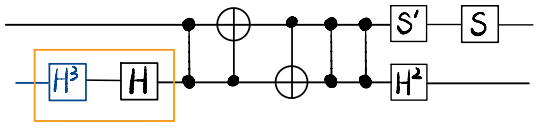
$\overset{C_2}{\underset{\text{Def 1}}{=}}$  $\cdot w^2$

$\overset{R_{33}^4}{=}$  $\cdot w^2 \cdot w^2$

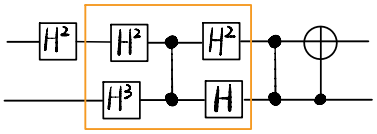
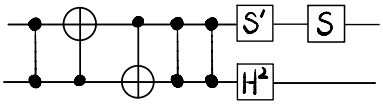
$\overset{C_1, C_2, C_3}{\underset{C_7, R_{15}}{=}}$  $\cdot w$

Then R_{30}:  WTS  $\cdot w$

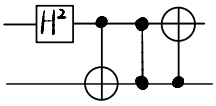
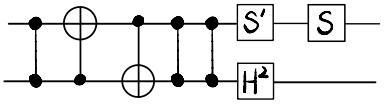
$\Vert$

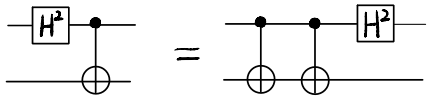
R_{30}:  WTS  $\cdot w$

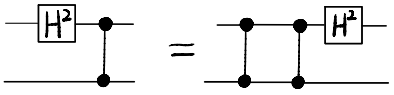
$\Vert C_2$

R_{30}:  WTS  $\cdot w$

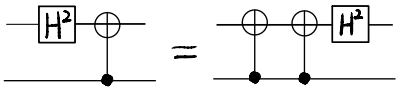
$\Vert R_{32}^3$

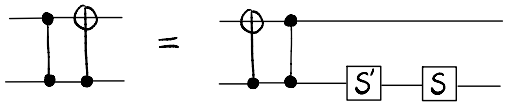
R_{30}:  WTS  $\cdot w$

C_8^8: 

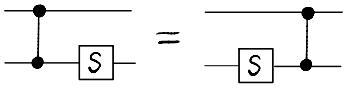
C_8^1: 

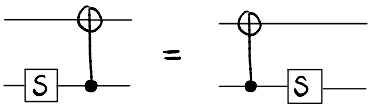
C_5: $SS' = S'S$

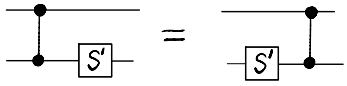
C_8^6: 

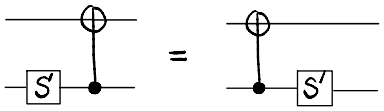
R_{25}^1: 

$\cdot w$

C_7: 

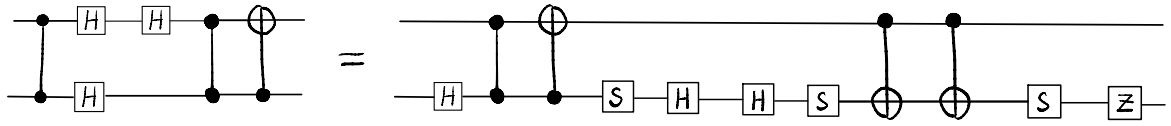
R_{24}: 

R_{15}: 

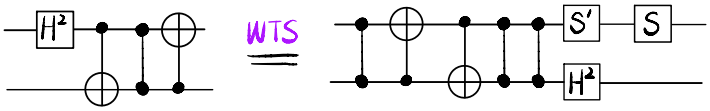
R_{24}^1: 

Def 1: $S' := H^2SH^2$

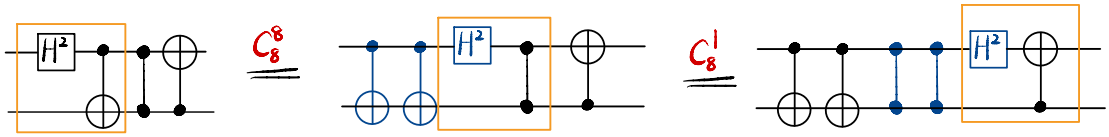
Lem V

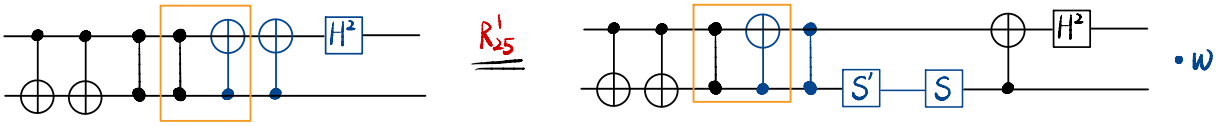
R_{30}: 

Proof cont.

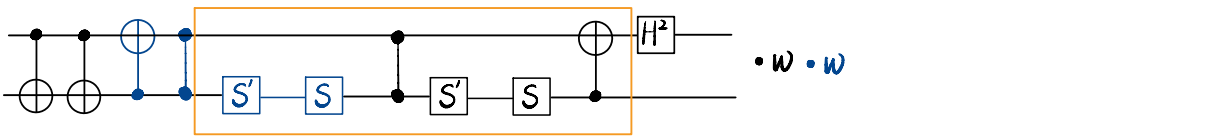
R_{30}: 

$\cdot w$

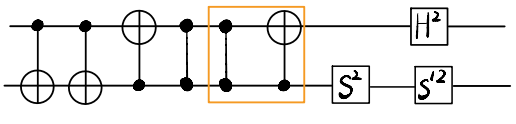
R_{30} LHS := 

C_8^6 

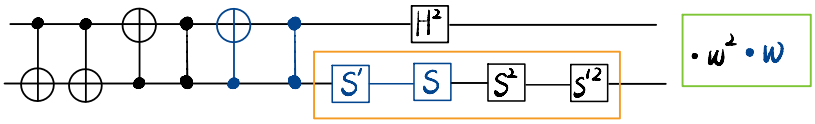
R_{25}^1 $\cdot w$

R_{25}^1 

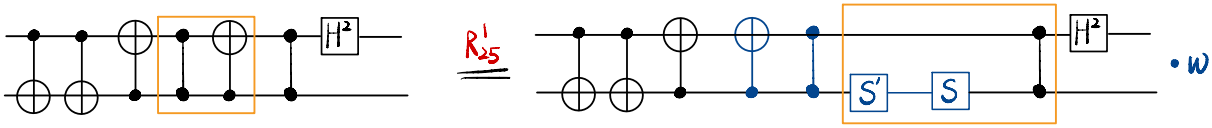
$\cdot w \cdot w$

C_5, C_7, R_{15} / R_{24}, R_{24}^1 

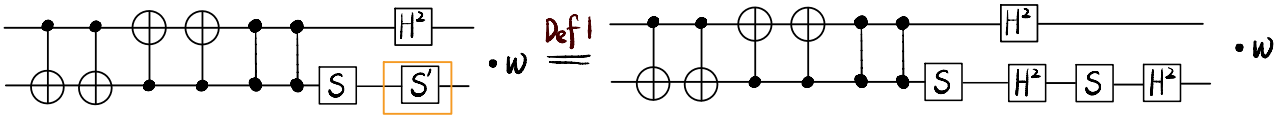
$\cdot w^2$

R_{25}^1 

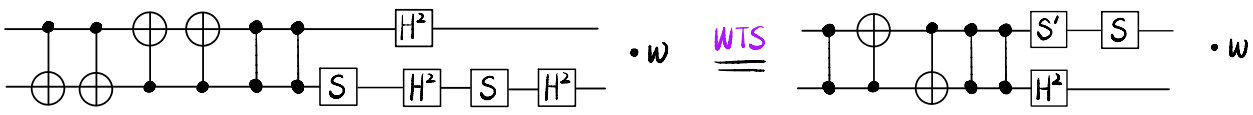
$\cdot w^2 \cdot w$

C_1, C_2 / C_3 

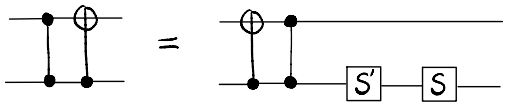
R_{25}^1 $\cdot w$

C_7 / R_{15} 

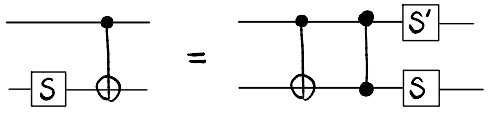
Def 1 $\cdot w$

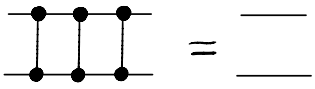
Hence R_{30}: 

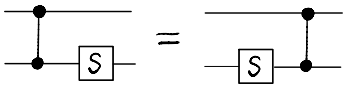
$\cdot w$

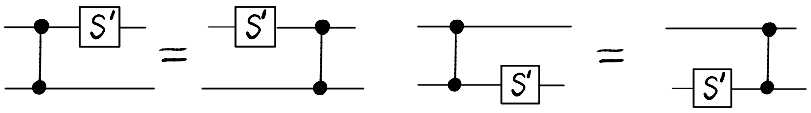
R^1_{25}:  $\cdot w$

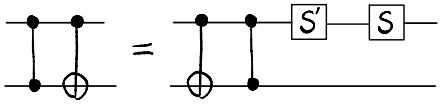
$C_3: S^3 = I$ $C_5: SS' = S'S$ Def 1:  $:= H^2SH^2$

R^4_{23}:  $\cdot w^2$

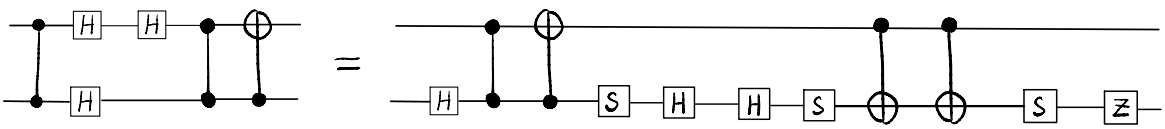
$C_1: w^3 = 1$ $C_2: H^4 = I$ C_6: 

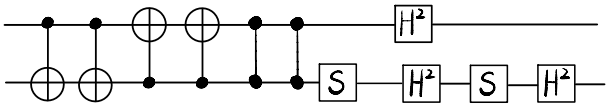
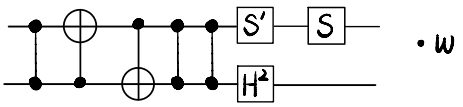
C_7: 

R_{15}: 

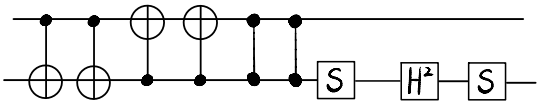
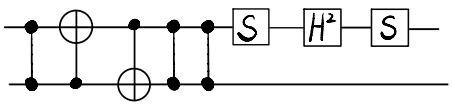
R^3_{25}:  $\cdot w$

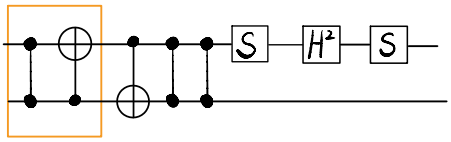
Lem V

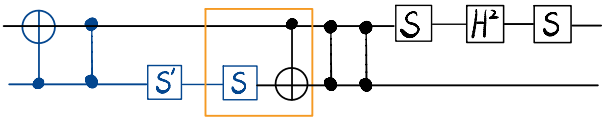
R_{30}: 

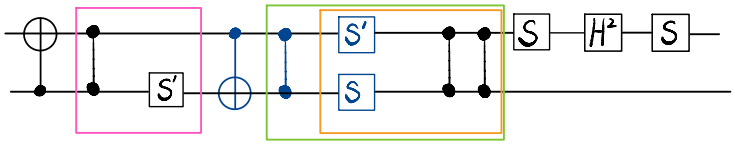
Proof cont. R_{30}:  $\cdot w$ WTS  $\cdot w$

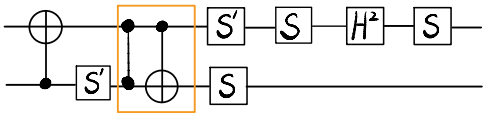
Def 1, $C_1 \| C_2, C_5$

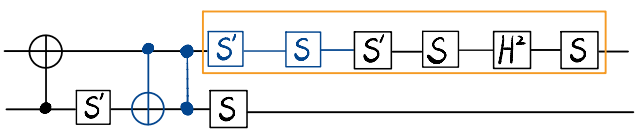
R_{30}:  WTS 

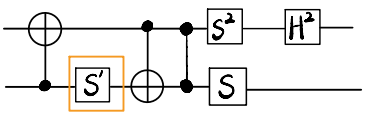
R_{30} RHS := 

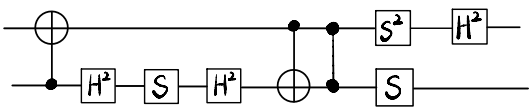
R^1_{25}  $\cdot w$

R^4_{23}  $\cdot w \cdot w^2$

C_6, C_7 / R_{15} 

R^3_{25}  $\cdot w$

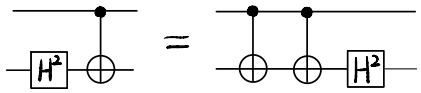
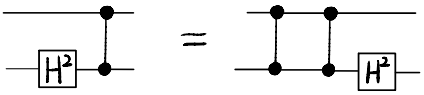
C_2, C_3 / Def 1, C_5  $\cdot w$

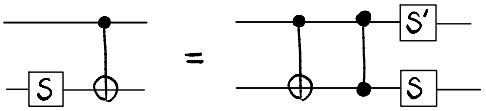
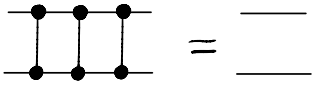
Def 1  $\cdot w$

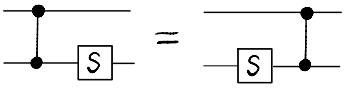
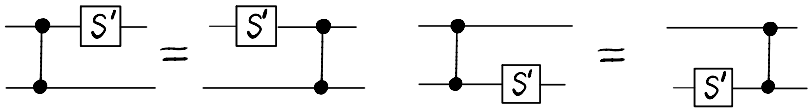
$S'SS'SH^2S \overset{C_5}{=} S^2S'^2H^2S \overset{\text{Def 1}}{=}$

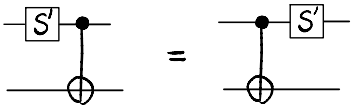
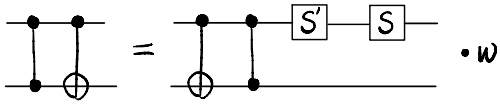
$S^2H^2S^2H^2H^2S \overset{C_2}{=} S^2H^2S^2S$

$\overset{C_3}{=} S^2H^2$

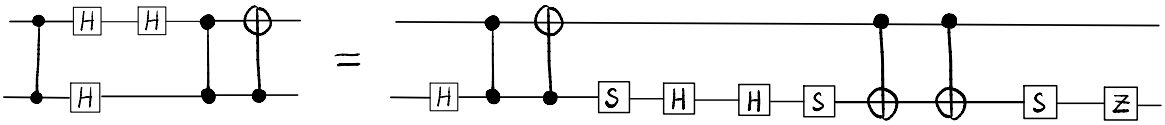
C_8^8:  C_8^1:  C_1: $w^3 = 1$

R_{23}^4:  $\cdot w^2$ C_6: 

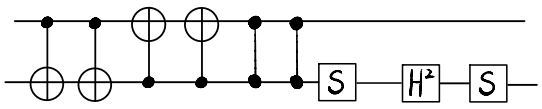
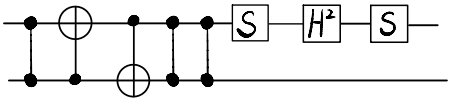
C_7:  R_{15}: 

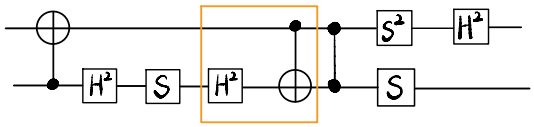
R_{24}^3:  R_{25}^3:  $\cdot w$

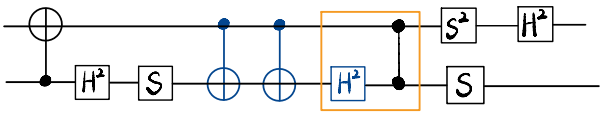
Lem V

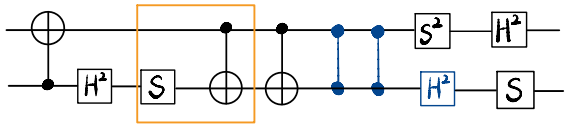
R_{30}: 

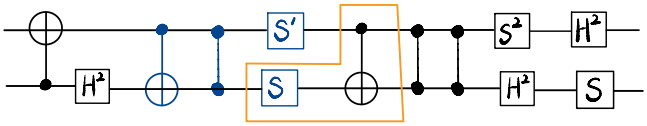
Proof cont.

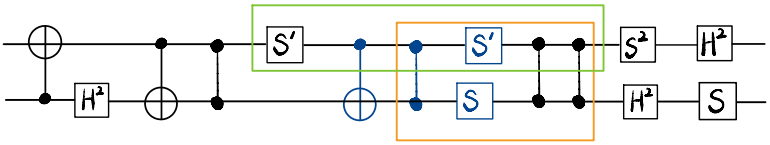
R_{30}:  WTS 

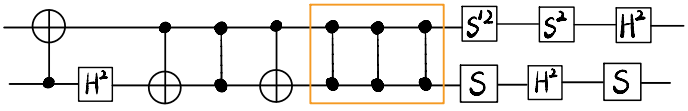
R_{30} RHS =  $\cdot w$

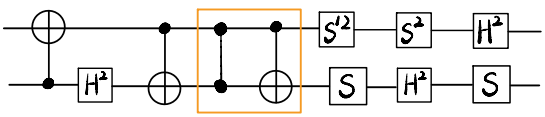
C_8^8  $\cdot w$

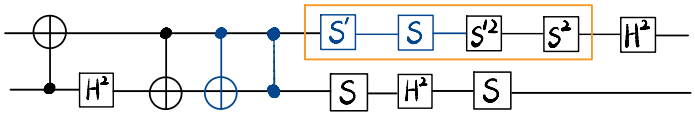
C_8^1  $\cdot w$

R_{23}^4  $\cdot w \cdot w^2$

R_{23}^4  $\cdot w^2$

C_7, R_{24}^3 / R_{15}  $\cdot w^2$

C_6  $\cdot w^2$

R_{25}^3  $\cdot w^2 \cdot w$

C_1, C_2, C_3 / Def 1, C_5