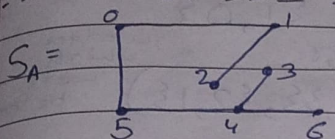


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$IN = \{\}$

$OUT = \{\}$

$F = (\{0,2\}, \{2,3\})$

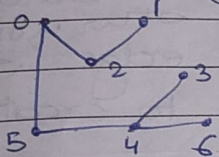
$G_A = G_1$

$Cycle_x = \{0,2\} : 0 \rightarrow 1 \rightarrow 2$

$\{2,3\} : 2 \rightarrow 1 \rightarrow 0 \rightarrow 5 \rightarrow 4 \rightarrow 3$

Children of  $S_A$  when we start with  $\{0,2\}$  to be incoming edge

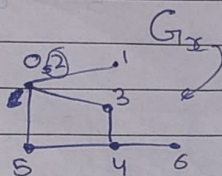
$S_B \rightarrow$  Swapping  $\{0,2\}$  with  $\{0,1\}$



$IN = (\{0,2\})$

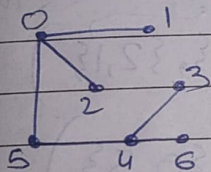
$OUT = (\{0,1\})$

$F = (\{2,3\})$



$Cycle_x = \{2,3\} : 0 \rightarrow 5 \rightarrow 4 \rightarrow 3$

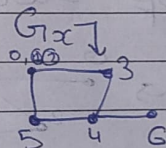
$S_C \rightarrow$  Swapping  $\{0,2\}$  with  $\{1,2\}$



$IN = (\{0,2\}, \{0,1\})$

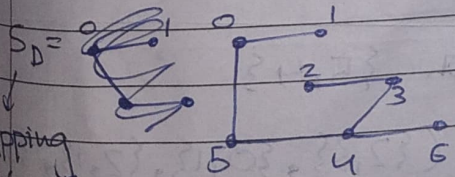
$OUT = (\{1,2\})$

$F = (\{2,3\})$



$Cycle_x = (\{2,3\} : 0 \rightarrow 5 \rightarrow 4 \rightarrow 3)$

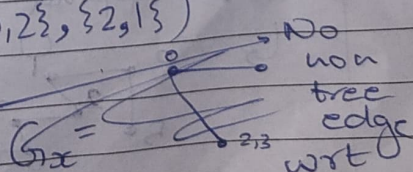
Children of  $S_A$  when  $\{2,3\}$  is incoming swapped with  $\{2,1\}$



$IN = (\{2,3\})$

$OUT = (\{0,2\}, \{2,1\})$

$F = (\{2,3\})$

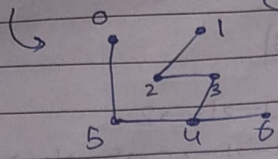


$Cycle_x = (\{2,3\} : 0 \rightarrow 5 \rightarrow 4 \rightarrow 3)$

Do not swap tree edge wrt  $S_D$  what is also in  $G_{1x}$



$S_E$  Swapping  $\{2,3\}$  with  $\{1,0\}$



$IN = (\{2,3\}, \{2,1\})$

$OUT = (\{0,2\}, \{1,0\})$

$F = ()$

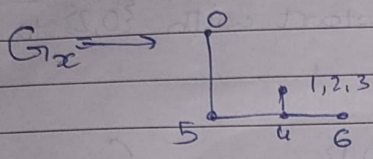
$Cycle_x = ()$

The edges which were replaced before

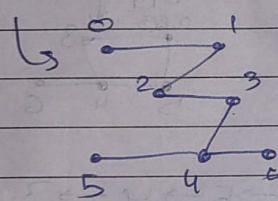
Because of

$OUT_{BKH} = OUT_A \neq U_{eff}$

Used for making children with other non-tree edge i.e.  $\{0,2\}$  to create  $S_B, S_E$



$S_F$  Swapping  $\{2,3\}$  with  $\{0,5\}$



$IN = (\{2,3\}, \{0,1\}, \{2,1\})$

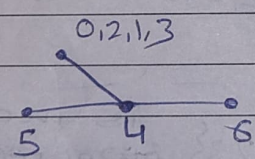
$OUT = (\{0,2\}, \{0,5\})$

$F = ()$

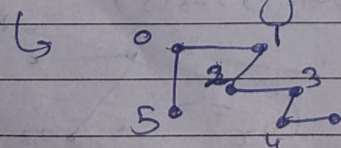
$Cycle_x = ()$

The edges swapped out before

$G_x =$



$S_G$  swapping  $\{2,3\}$  with  $\{5,4\}$



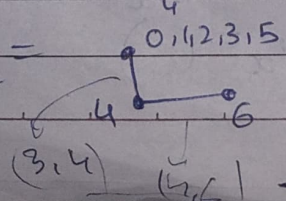
$IN = (\{2,3\}, \{0,1\}, \{2,1\}, \{0,5\})$

$OUT = (\{0,2\}, \{5,4\})$

$F = ()$

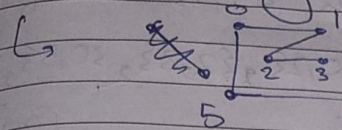
$Cycle_x = ()$

$G_x =$





$S_H$  swapping  $\{2, 3\}$  with  $\{4, 3\}$



$$IN = (\{2, 3\}, \{0, 1\}, \{2, 1\}, \{0, 5\}, \{5, 4\})$$

$$OUT = (\{0, 2\}, \{4, 3\})$$

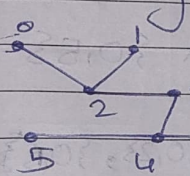
$$G_x = \begin{array}{c} 0, 1, 2, 3, 4, 5 \\ \downarrow \\ 6 \end{array}$$

$$F = ()$$

$$Cycle_x = ()$$

Children of  $S_B$  where  $\{2, 3\}$  is incoming edge

$S_I$  Replacing  $\{2, 3\}$  with  $\{0, 5\}$  in  $S_B$



$$IN_{B_i} = (IN_A \cup \{0, 5\}, \{2, 3\})$$

$$IN = (\{0, 2\}, \{2, 3\})$$

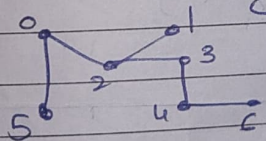
$$OUT = (\{0, 1\}, \{0, 5\})$$

$$F = ()$$

$$G_x \rightarrow \begin{array}{c} 0, 2, 3 \\ \downarrow \\ 4 \end{array}$$

$$Cycle_x = ()$$

$S_J$  Replacing  $\{2, 3\}$  with  $\{5, 4\}$  in  $S_B$



$$IN_{B_i} = (IN_A \cup \{5, 4\}, \{2, 3\})$$

$$OUT = (\{0, 1\}, \{5, 4\})$$

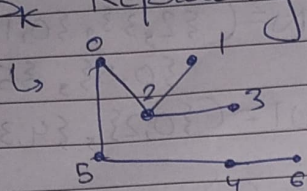
$$G_x = \begin{array}{c} 0, 2, 3, 5 \\ \downarrow \\ 4 \end{array}$$

$$F = ()$$

$$Cycle_x = ()$$



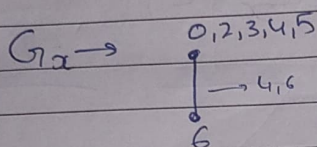
$S_K$  Replacing  $\{2,3\}$  with  $\{4,3\}$  in  $S_B$



$IN = (\{0,2\}, \{2,3\}, \{0,5\}, \{5,4\})$

Prev. Swaps

$OUT = (\{0,1\}, \{4,3\})$

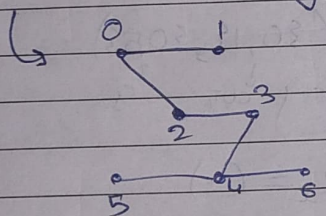


$F = ()$

$Cycle_x = ()$

Children of  $S_C$  where  $\{2,3\}$  is incoming

$S_L$  Replacing  $\{2,3\}$  with  $\{0,5\}$  in  $S_C$



$IN = (\{0,2\}, \{0,5\}, \{2,3\})$

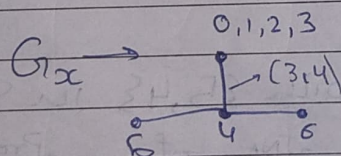
$IN_A$

No Prev. swap

$OUT = (\{1,2\}, \{0,5\})$

$OUT_A$

$e_j$

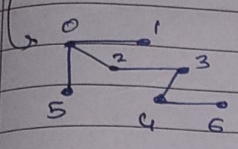


$F = ()$

$Cycle_x = ()$



$S_M \rightarrow$  Replacing  $\{2, 3\}$  with  $\{5, 1\}$  in  $S_c$



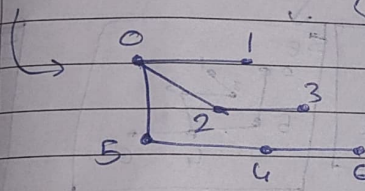
IN = C ( $\{0, 2\}$ ,  $\{0, 1\}$ ,  $\{2, 3\}$ ,  $\{0, 5\}$ )  
 TNA Prev Swaps

OUT = ( $\{1, 2\}$ ,  $\{5, 4\}$ )

$G_x \rightarrow 0, 1, 2, 3, 5$   $F = ()$

$\text{Cycle} = ()$

$S_N \rightarrow$  Replacing  $\{2, 3\}$  with  $\{4, 3\}$  in  $S_c$



IN = ( $\{0, 2\}$ ,  $\{0, 1\}$ ,  $\{2, 3\}$ ,  $\{0, 5\}$ ,  $\{5, 4\}$ )  
 TNA Prev Swaps

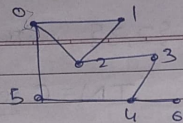
OUT = ( $\{1, 2\}$ ,  $\{4, 3\}$ )

$G_x \rightarrow 0, 1, 2, 3, 4, 5$   $F = ()$

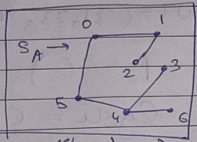
$\text{Cycle}_x = ()$



# COMPUTATION TREE FOR



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$\{2,3\} \rightarrow \{5,4\}$

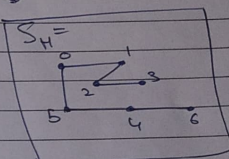
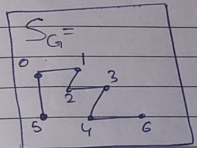
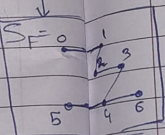
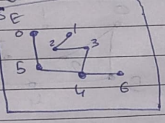
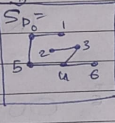
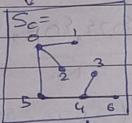
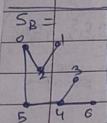
$\{2,3\} \rightarrow \{0,5\}$

$\{0,2\} \rightarrow \{0,1\}$

$\{0,2\} \rightarrow \{1,2\}$

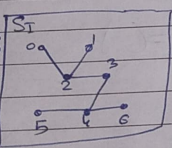
$\{2,3\} \rightarrow \{2,1\}$

$\{2,3\} \rightarrow \{5,4\}$

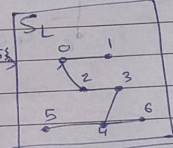


$\{2,3\} \rightarrow \{4,3\}$

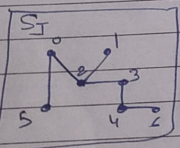
$\{2,3\} \rightarrow \{0,1\}$



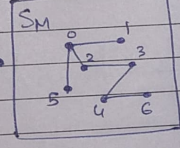
$\{2,3\} \rightarrow \{0,5\}$



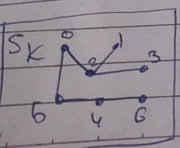
$\{2,3\} \rightarrow \{5,4\}$



$\{2,3\} \rightarrow \{5,4\}$



$\{2,3\} \rightarrow \{4,3\}$



$\{2,3\} \rightarrow \{4,3\}$

