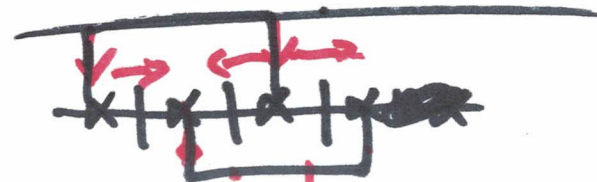
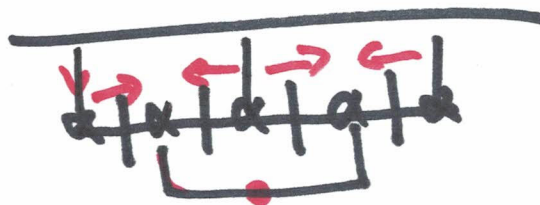


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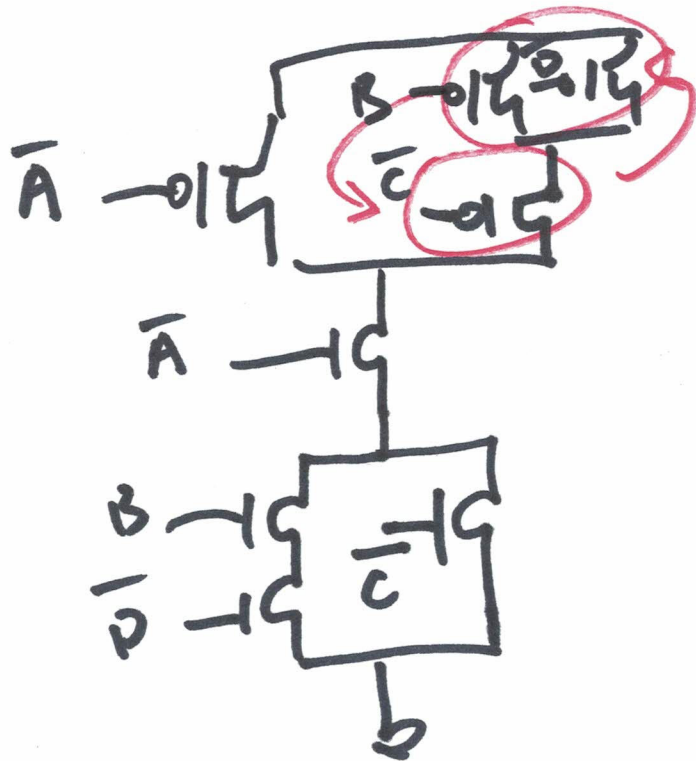


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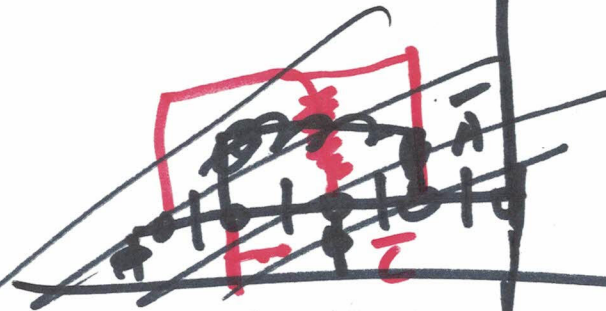


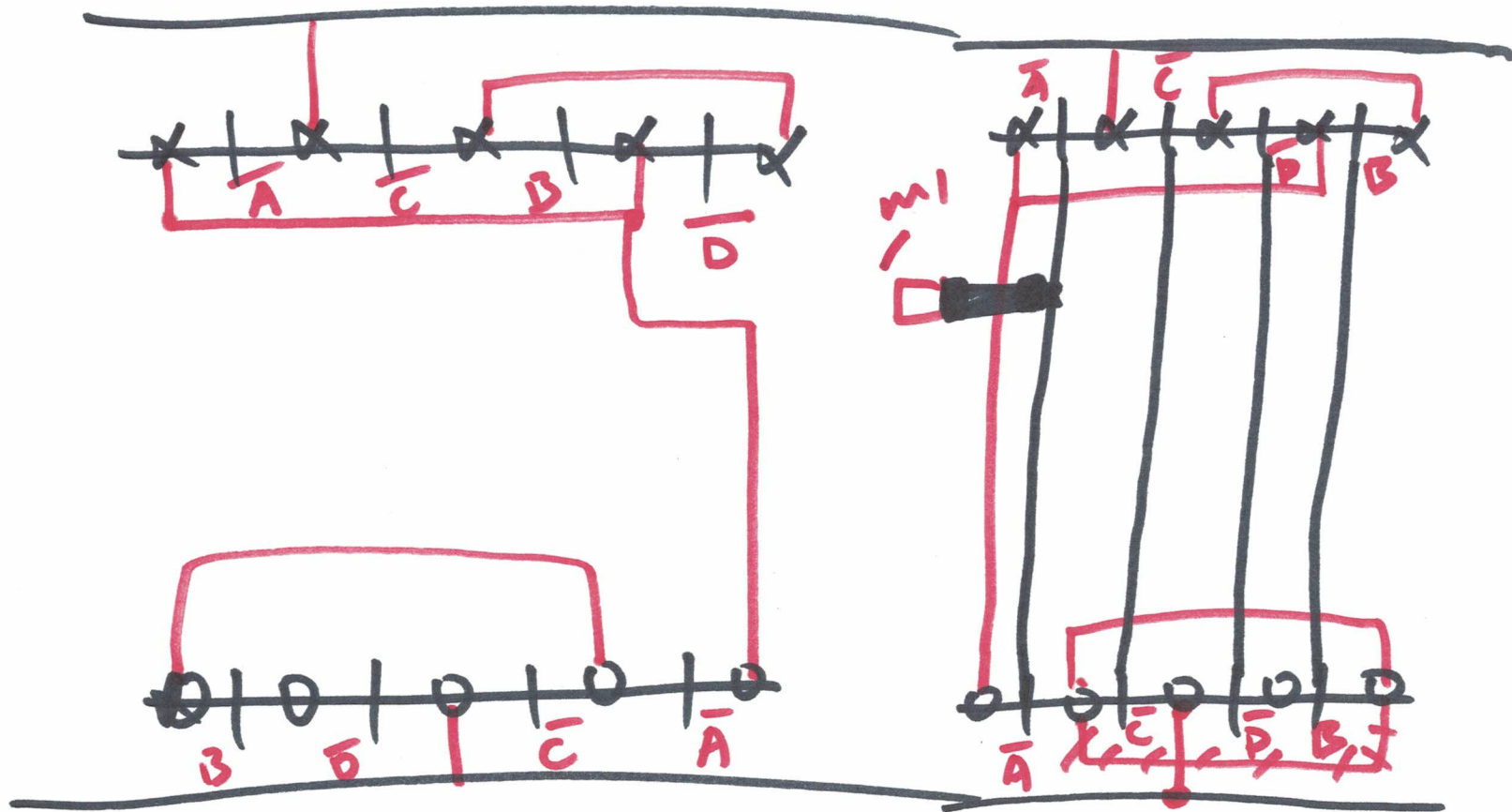
$$Y = A + \bar{B}C + CD = \overline{A + (\bar{B}C + CD)} = \overline{\bar{A} \cdot (\bar{B}C + CD)}C$$

$$= \overline{\bar{A} \cdot (\overline{(\bar{B} + D)} + \bar{C})} = \overline{\bar{A} \cdot (\bar{B} \cdot \bar{D} + \bar{C})} = \overline{\bar{A} \cdot (\bar{B} \cdot \bar{D} + \bar{C})}$$



Redraw
next page



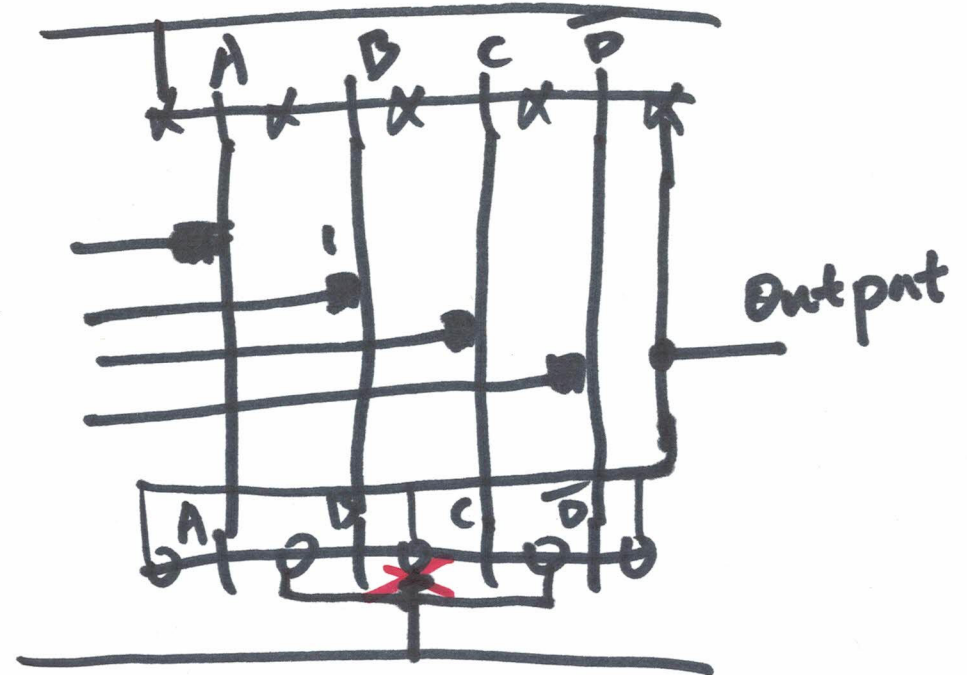
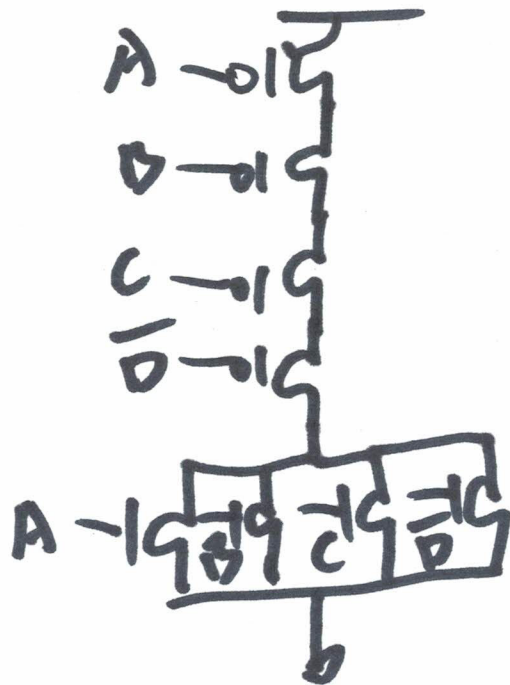


(3)

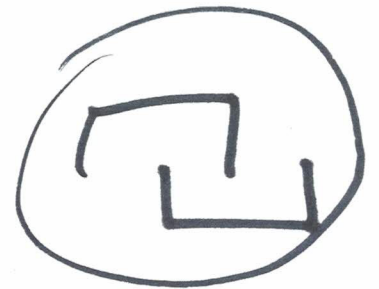
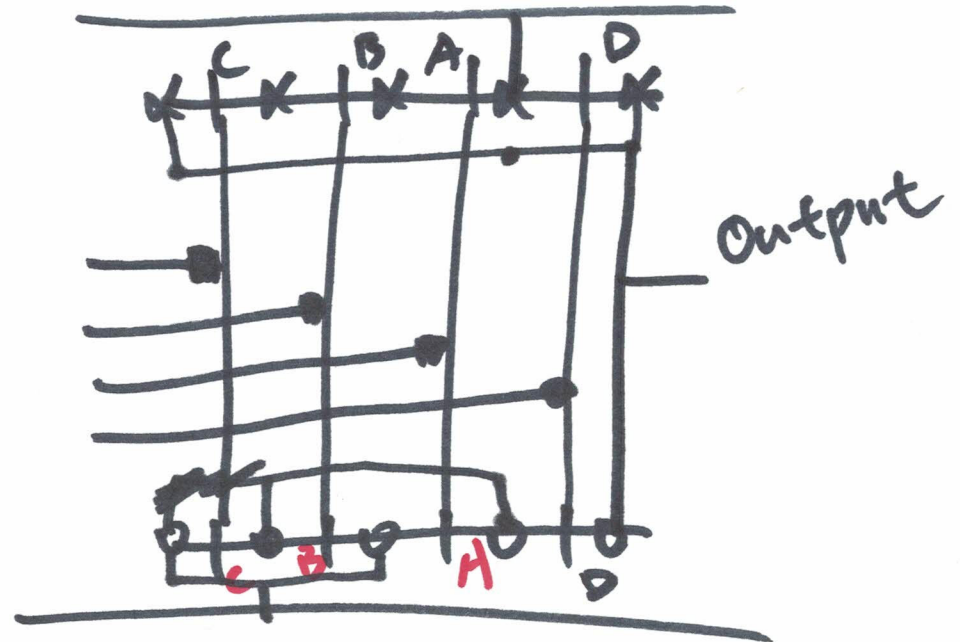
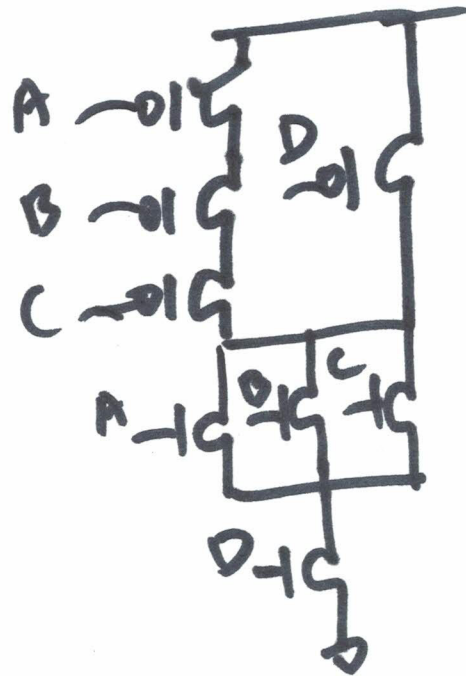
$$Y = \overline{A+B+C} \cdot D = \overline{\overline{A+B+C}} \cdot D$$

$$= \overline{\overline{A+B+C}} + \overline{D} = \overline{A+B+C} + \overline{D}$$

4-input NOR gate

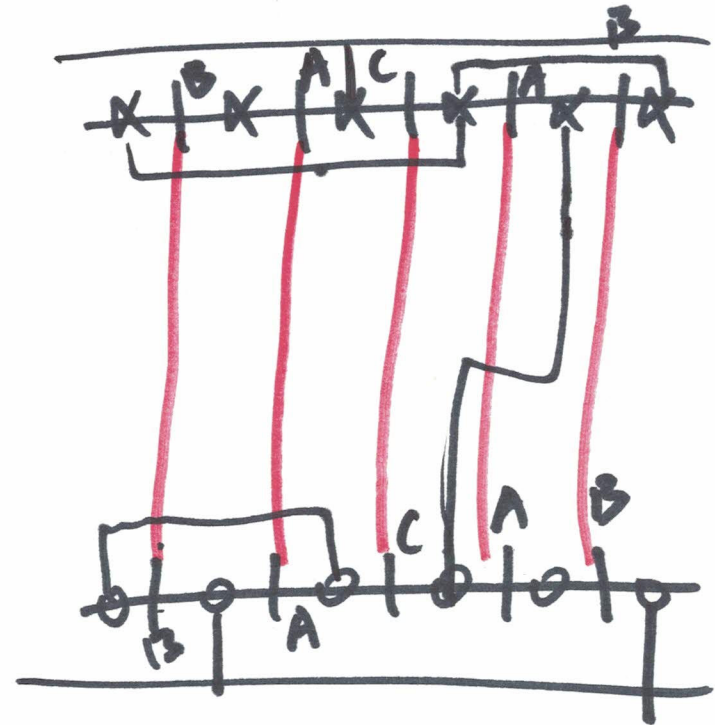
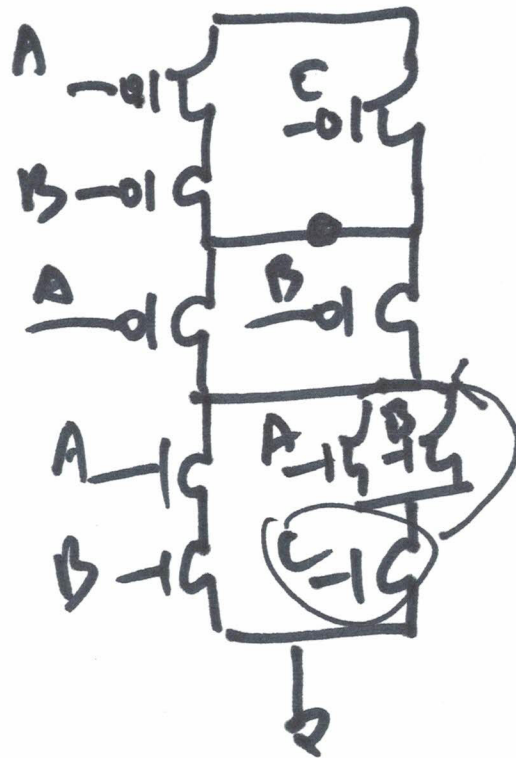


$$Y = \overline{(A+B+C)} \cdot D$$



(5)

$$Y = \overline{AB+AC+BC} = \underline{\overline{AB}} + \overline{(A+B)C}$$



$$(ABCD + \cancel{ABD} + DC) \cdot D$$

$$= ABCD \cdot \cancel{D} + ABD + DC \cdot \cancel{D}$$

$$= \underline{ABCD} + \underline{ABD} + DC$$

$$= ABD(\cancel{C+1}) + DC = ABD + DC$$

$$= (AB+D)D$$

(b)