Q2

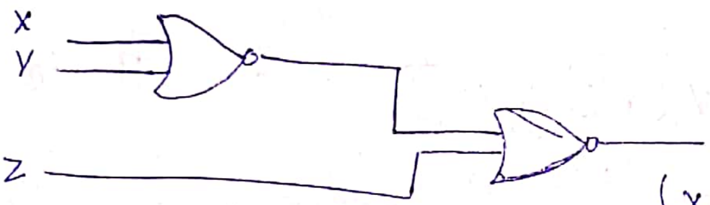
The NAND And NOR commutative not associative.

Sol: $(x \downarrow y) \downarrow z = [(x+y)' + z]' = (x+y)''z' = (x+y)z'$

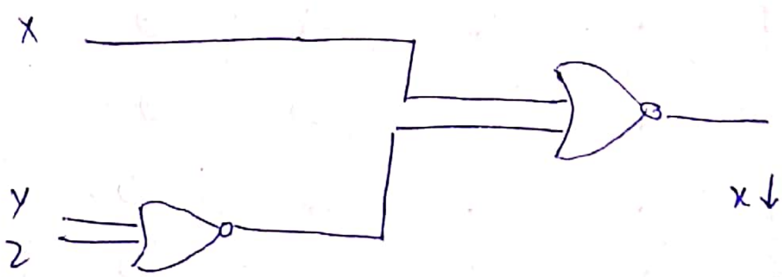
$\cancel{(x \downarrow y) =}$

$x \downarrow (y \downarrow z) = [x + (y+z)']' = x'(y+z)$

$x'(y+z)$



$(x \downarrow y) \downarrow z = (x+y)z'$



$x \downarrow (y \downarrow z) = x'(y+z)$

nonassociativity of the NOR operator:

Therefore: $(x \downarrow y) \downarrow z \neq x \downarrow (y \downarrow z)$

Truth table:-

a NAND

b: NOR

Commutation $\overline{A \cdot B} = \overline{BA}$

Commutation $= \overline{A+B} = \overline{B+A}$

A	B	$\overline{A \cdot B}$	$\overline{BA}$	$\overline{A+B}$	$\overline{B+A}$
0	0	1	1	1	1
0	1	1	1	0	0
1	0	1	1	0	0
1	1	0	0	0	0

a: Associative $\overline{A \cdot (B \cdot C)} = \overline{(A \cdot B)C}$

b: $\overline{A+(B+C)} = \overline{(A+B)+C}$

A	B	C	$\overline{A(B \cdot C)}$	$\overline{(A \cdot B)C}$	$\overline{A+(B+C)}$	$\overline{(A+B)+C}$
0	0	0	1	1	1	1
0	0	1	1	1	0	0
0	1	0	1	1	0	0
0	1	1	1	1	0	0
1	0	0	1	1	0	0
1	0	1	1	1	0	0
1	1	0	1	1	0	0
1	1	1	0	0	0	0

NAND and NOR gate are
commutative and associative