NOR $\overline{(A+B)}$ NAND $\overline{(A\cdot B)}$

- NOT $\equiv \bar{A}$, $\bar{A} = \overline{(A+A)}$ 1 NOR NOR

$\bar{A} = \overline{(A\cdot A)}$ 1 NAND NAND

- OR $\equiv A+B$, $A+B$

NOR $A+B = (A+B)(A+B) = \overline{\overline{(A+B)(A+B)}} = \overline{\overline{(A+B)}+\overline{(A+B)}}$

o $A+B = A+B\cdot B = (A+B)(A+B)$ NAND $A+B = \overline{\overline{A+B}} = \overline{\bar{A}\cdot\bar{B}} = \overline{\overline{AA}\cdot\overline{BB}}$

(2 NOR's) (3 NAND,s)

- AND $\equiv A\cdot B$, $A\cdot B$

NOR $A\cdot B = \overline{\overline{A\cdot B}} = \overline{\bar{A}+\bar{B}} = \overline{\overline{A+A}+\overline{B+B}}$

NAND $A\cdot B = A\cdot(B+B) = (A\cdot B)(A\cdot B) = \overline{\overline{(A\cdot B)(A\cdot B)}} = \overline{\overline{A\cdot B}+\overline{A\cdot B}}$

(3 NOR,s) (2 NAND,s)

- XOR $\equiv A\bar{B}+\bar{A}B$, $A\oplus B$

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

$= \overline{\overline{(A\cdot\overline{BB})}\cdot\overline{(\overline{AA}\cdot B)}}$

$A\oplus B \equiv A\bar{B}+\bar{A}B$

(5 NAND's)

NOR $A\bar{B}+\bar{A}B = \overline{\overline{A\bar{B}}}+\overline{\overline{\bar{A}B}} = \overline{\bar{A}+\bar{\bar{B}}}+\overline{\bar{\bar{A}}+\bar{B}} = \overline{\bar{A}+B}+\overline{A+\bar{B}} =$ OR

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

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

$A\oplus B \equiv A\bar{B}+\bar{A}B$

(6 NOR,s)