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EECE 312L
Pre LAB-11

Note: $\overline{A+B} = \overline{A}\,\overline{B}$ & $\overline{AB} = \overline{A} + \overline{B}$

■ $S = \overline{\overline{A(\overline{AB})}.\overline{B(\overline{AB})}}$

• $A(\overline{AB}) = A(\overline{A} + \overline{B}) = A\overline{A} + A\overline{B}$

• $\overline{A(\overline{AB})} = \overline{A\overline{A} + A\overline{B}} = (\overline{A\overline{A}})(\overline{A\overline{B}})$

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

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

• $B(\overline{AB}) = B(\overline{A} + \overline{B}) = B\overline{A} + B\overline{B}$

• $\overline{B(\overline{AB})} = \overline{B\overline{A} + B\overline{B}} = (\overline{B\overline{A}})(\overline{B\overline{B}})$

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

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

• $\overline{A(\overline{AB})}.\overline{B(\overline{AB})} = (\overline{A} + A)(\overline{A} + B)(\overline{B} + A)(\overline{B} + B)$

■ $S = \overline{\underbrace{(\overline{A} + A)(\overline{A} + B)}_{a}\underbrace{(\overline{B} + A)(\overline{B} + B)}_{b}}$

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

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

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

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

We have that $A\overline{A} = 0$ & $B\overline{B} = 0$ for any A and B
So:

■ $S = A\overline{B} + B\overline{A}$

■ $S = \overline{A}B + A\overline{B}$