



# SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35

Accredited by NBA-AICTE and Accredited by NAAC – UGC with A+ Grade  
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai



## *19ECB231/ Digital Electronics*

### Minimization of Boolean expressions





## What is Minimization?

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- In mathematics, expressions are simplified for a number of reasons, for instance simpler expressions are easier to understand and easier to write down, they are also less prone to error in interpretation but, most importantly, simplified expressions are usually more efficient and effective when implemented in practice.
- A Boolean expression is composed of variables and terms. The simplification of Boolean expressions can lead to more effective computer programs, algorithms and circuits.



## What is Minimization?

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- Minimisation can be achieved by a number of methods, three well known methods are:
  1. Algebraic Manipulation of Boolean Expressions
  2. Tabular Method of Minimization
  3. Karnaugh Maps



## Algebraic Manipulation of Boolean Expressions

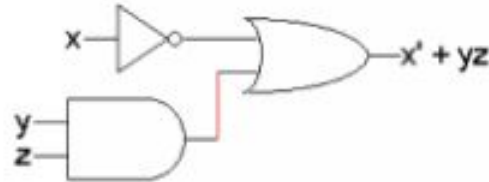
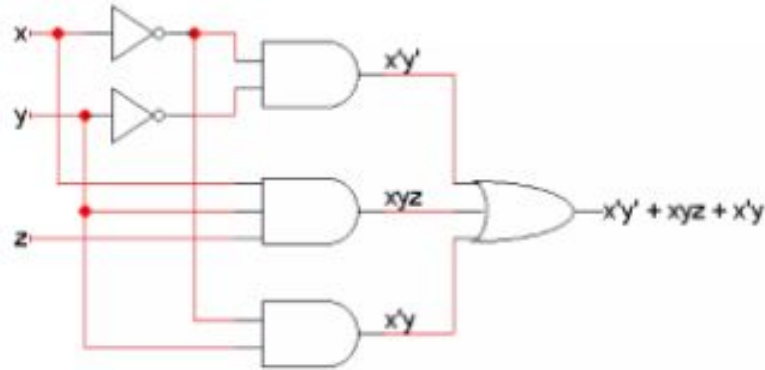
- We can now start doing some simplifications

$$\begin{aligned} & x'y' + xyz + x'y \\ &= x'(y' + y) + xyz \quad [ \text{Distributive: } x'y' + x'y = x'(y' + y) ] \\ &= x' \cdot 1 + xyz \quad [ \text{complement: } x' + x = 1 ] \\ &= x' + xyz \quad [ \text{identity: } x' \cdot 1 = x' ] \\ &= (x' + x)(x' + yz) \quad [ \text{Distributive} ] \\ &= 1 \cdot (x' + yz) \quad [ \text{complement: } x' + x = 1 ] \\ &= x' + yz \quad [ \text{identity} ] \end{aligned}$$



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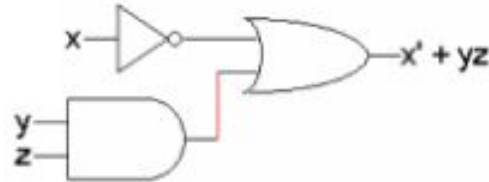
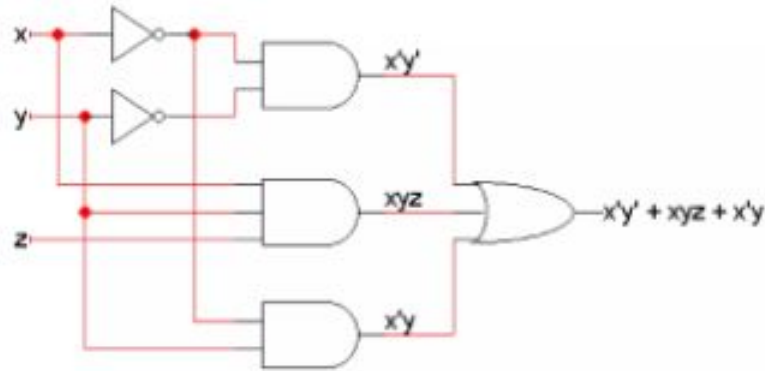
- Here are two different but *equivalent* circuits.
- In general the one with fewer gates is "better":
  - It costs less to build
  - It requires less power
  - But we had to do some work to find the second form





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# RECAP





Thank You!