RECITATION #1

Sept 20, 2002

DIGITAL LOGIC

Topics Covered:

B.1 Introduction

B.2 Gates, Truth Table and Logic Equations
- Truth Table
- Boolean Algebra
- Gates

B.3 Combinational Logic
- Decoders
- Multiplexors
- Two level logic and PLAs
- Sum of Product
- ROMs
- Don't Cares
- Array of Logic Elements

B.4 Clocks

B.5 Memory Elements
- SR Latch
- Flip Flop and Latches
- Register Files

EXERCISES

B.7.

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

$$= ((A\cdot B)+(A\cdot C)+(B\cdot C))\cdot(\bar{A}+\bar{B}+\bar{C}) \quad \text{- DeMorgan}$$

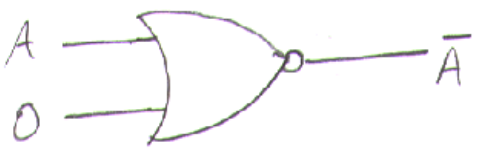
$$= (\bar{A}+\bar{B}+\bar{C})\cdot(A\cdot B)+(\bar{A}+\bar{B}+\bar{C})(A\cdot C)$$
$$+(\bar{A}+\bar{B}+\bar{C})(B\cdot C) \quad \text{- Distributive La}$$

$$= \bar{A}AB+\bar{B}AB+\bar{C}AB+\bar{A}AC+\bar{B}AC+\bar{C}AC$$
$$+\bar{A}BC+\bar{B}BC+\bar{C}BC \quad \text{- Distributi}$$

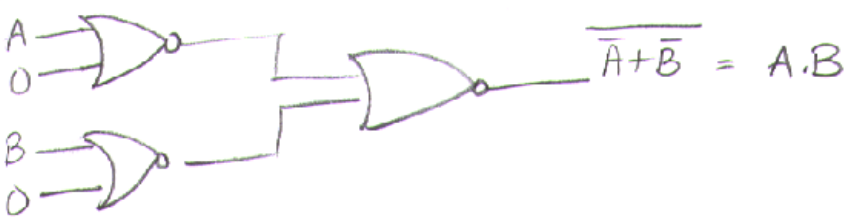
$$= AB\bar{C}+\bar{B}AC+\bar{A}BC \quad \text{— using Inverse Laws}$$

B.3

NOT gate using NOR

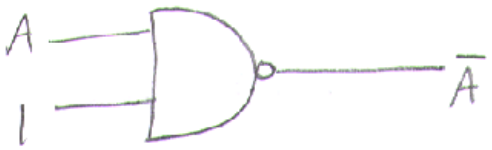


AND gate using NOR



OR gate using NOR

B.4 NOT gate using NAND



Try AND using NAND yourself
Try OR using NAND yourself

B.8 $E = (A.B.\bar{C}) + (A.C.\bar{B}) + (B.C.\bar{A})$

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

$= \overline{(\overline{A.B.\bar{C}}) \cdot (\overline{AC\bar{B}}) \cdot (\overline{BC\bar{A}})}$ using De Morgan's Law

$= \overline{(\bar{A}+\bar{B}+C) \cdot (\bar{A}+\bar{C}+B) \cdot (\bar{B}+\bar{C}+A)}$ using De Morgan's Law