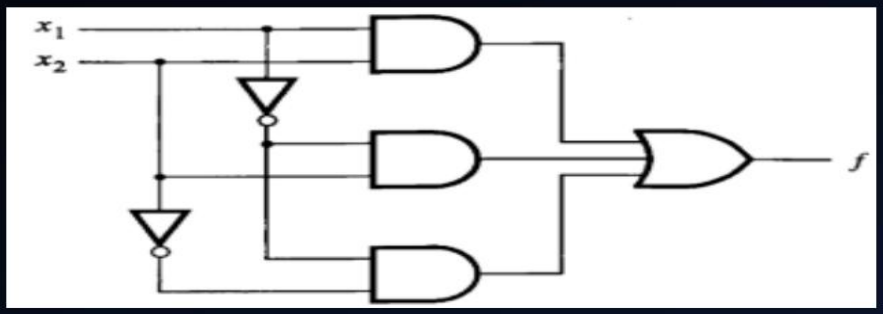
Lecture 1

Problems

- Derive the truth table and draw the logic circuits which correspond to the following expressions:
  a) F= A'BC' + A'BC + AB'
  b) F= XY'Z + X'Y'Z + XYZ
  c) F= [A(B+C') + A'B]C
  d) F= XY'(Z+Y') + X'Z
  e) F= (A+B').(A+B)'

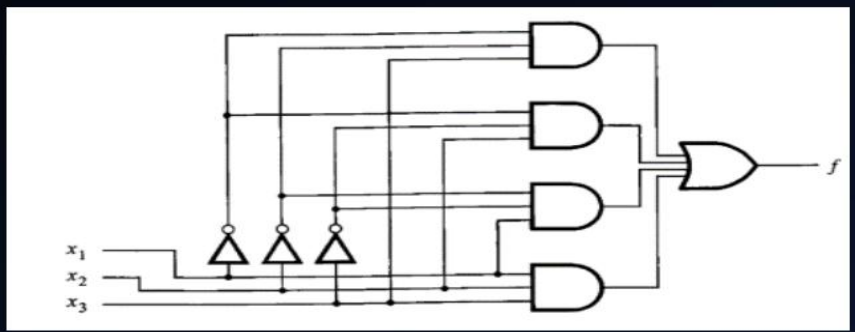
Problems

- Which the logic expression corresponds to the following logical circuit:



Problems

- Which the logic expression corresponds to the following logical circuit and truth table:



Lecture 2

Exercises

- Draw the circuit to represent the following expressions: (By NAND gate only once and using NOR gate only once)

1. $F = (x + y).z'$
2. $F = (x' + y) \cdot Z + w$
3. $F = x.y.z + x.w'$

Assignments

- Draw the NAND logic diagram for each of the following expressions:

1. $F = (AB' + CD').E + BC(A + B)$
2. $F = w.(x + y + z) + x.y.z$

Lecture 3

Assignment

- Simplify the following Boolean expressions to a minimum number of literals:
  1. XY + X(+WZ+WZ')
  2. (BC' + A'D)(AB'+CD')
- Reduce the following Boolean expressions to the indicated number of literals:
  1. A'C' + ABC + AC' to three literals
  2. (X'Y'+Z') + Z + XY + WZ to three literals
  3. A'B(D' + C'D)+ B(A + A'CD)
  4. (A' + C)(A' + C')(A+B+C'D)

Lecture 4

Assignments

1. Find the complement of the following expressions:
   a. xy'+ x'y
   b. (x+y'+z)(x'+z')(x'+y)
2. Express the Boolean function in Sum of Minterms and Product of Maxterms:

$$F(A,B,C,D) = B'D + A'D + BD$$

Assignments

3. Find Sum of Product and Product of Sum to the functions of the following table

X	Y	Z	F1	F2	F3	F4
0	0	0	0	0	0	0
0	0	1	0	1	1	1
0	1	0	0	0	0	0
0	1	1	0	0	1	0
1	0	0	0	1	1	0
1	0	1	0	1	1	0
1	1	0	1	1	0	0
1	1	1	0	1	0	0

Lecture 5

Assignments

- Simplify the following Boolean functions to a minimum number of literals:

1) A +AB
2) AB+AB’
3) X+X'Y
4) (X+Y)(X+Y')
5) A'BC + AC
6) A'B+ ABC' +ABC
7) AB + A(CD + CD')
8) XY+ X'Z + YZ
9) A'C' + AC'+ ABC
10) (BC'+A'D).(AB'+CD')

Assignments

- Answers to problems:

3.1* Simplify the following Boolean functions, using three-variable maps:

(a) $F(x, y, z) = \Sigma(0, 2, 6, 7)$ (b) $F(x, y, z) = \Sigma(0, 2, 3, 4, 6)$

(c) $F(x, y, z) = \Sigma(0, 1, 2, 3, 7)$ (d) $F(x, y, z) = \Sigma(3, 5, 6, 7)$

3.2 Simplify the following Boolean functions, using three-variable maps:

(a)* $F(x, y, z) = \Sigma(0, 1, 5, 7)$ (b)* $F(x, y, z) = \Sigma(1, 2, 3, 6, 7)$

(c) $F(x, y, z) = \Sigma(0, 1, 6, 7)$ (d) $F(x, y, z) = \Sigma(0, 1, 3, 4, 5)$

(e) $F(x, y, z) = \Sigma(1, 3, 5, 7)$ (f) $F(x, y, z) = \Sigma(1, 4, 5, 6, 7)$

3.3* Simplify the following Boolean expressions, using three-variable maps:

(a)* $F(x,y,z) = xy + x'y'z' + x'yz'$ (b)* $F(x,y,z) = x'y' + yz + x'yz'$

(c)* $F(x, y, z) = x'y + yz' + y'z'$ (d) $F(x, y, z) = xyz + x'y'z + xy'z'$

Lecture 6

Questions

- Draw the truth table of a three bits full adder. Use the output to draw the circuit diagram.

- Design a four-bit parallel subtractor circuit, then explain how you can use the circuit to subtract the following example 1101-1011.

Lecture 7

Questions

- List with drawing the truth table of an 3x8 decoder circuit diagram
- List the truth table of an 3x8 decoder. Then draw the circuit diagram. Show how can you implement a full subtractor circuit using a 3x8 decoder.
- Construct 3x8 decoder using 2x4 decoders, then writhe the truth table.
- Construct 4x16 decoder using 3x8 decoders