Creating a Logic Circuit from a Truth Table

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Truth Table To Circuit

A	B	C	D	F
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	1
1	0	1	0	0
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

Since the expression is written in Sum of Products (SOP) form, if any one of the terms is “true”, the F is true. If All terms are “false” then F is false.

Select all of the True Terms

A	B	C	D	F
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
1	0	0	1	1
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

Group Terms

A	B	C	D	F
0	0	1	0	1
0	0	0	1	1
0	0	1	1	1
1	0	0	1	1
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

Terms

When A=B=0, C = 1, F = 1 → A’B’C

When B=0, D=1 F = 1 → B’D

When A=B=1, F = 1 → AB

Expression: F = AB + A’B’C + B’D

Convert the Expression to a Circuit

Expression: F = AB + A’B’C + B’D