

1.

A \ B	0	1
0	0	1
1	1	0

SOP

$$F = AB' + A'B$$

POS

$$F' = A'B' + AB$$

$$(F')' = (A'B' + AB)'$$

$$F = (A+B)(A'+B')$$

2.

Truth table

A	B	Cin	Sum	Cont
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

Kmap for Sum

Cin \ AB	00	01	11	10
0	0	1	0	1
1	1	0	1	0

SOP

$$F = A'B'Cin + A'BCin' + ABCin + AB'Cin'$$

POS

$$F' = A'B'Cin' + A'BCin + ABCin' + AB'Cin$$

$$(F')' = (A'B'Cin' + A'BCin + ABCin' + AB'Cin)'$$

$$F = (A+B+Cin) + (A+B'+Cin') + (A'+B'+Cin) + (A'+B+Cin)$$

Kmap for Cont

Cin \ AB	00	01	11	10
0	0	0	1	0
1	0	1	1	1

SOP

$$F = AB + A'BCin + AB'Cin$$

POS

$$F' = A'B' + A'BCin' + AB'Cin'$$

$$(F')' = (A'B' + A'BCin' + AB'Cin')'$$

$$F = (A+B)(A+B'+Cin)(A'+B+Cin)$$

3.

Truth table

A	B	C	D	z_1	z_2	z_3
0	0	0	0	0	0	1
0	0	0	1	0	1	0
0	0	1	0	0	1	0
0	0	1	1	0	1	0
0	1	0	0	1	0	0
0	1	0	1	0	0	1
0	1	1	0	0	1	0
0	1	1	1	0	1	0
1	0	0	0	1	0	0
1	0	0	1	1	0	0
1	0	1	0	0	0	1
1	0	1	1	0	1	0
1	1	0	0	1	0	0
1	1	0	1	1	0	0
1	1	1	0	1	0	0
1	1	1	1	0	0	1

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AB \ CD	00	01	11	10
00	0	1	1	1
01	0	0	1	1
11	0	0	0	0
10	0	0	1	0

SOP

$$F = AC' + A'BC'D' + ABCD'$$

POS

$$F' = A'B' + CD + A'BC'D + A'BCD' + AB'CD'$$

$$(F') = (A'B' + CD + A'BC'D + A'BCD' + AB'CD')$$

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

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AB \ CD	00	01	11	10
00	0	0	0	0
01	1	0	0	0
11	1	1	0	1
10	1	1	0	0

SOP

$$F = A'C + A'D'C'D + AB'CD$$

POS

$$F' = AB + C'D' + A'B'C'D + AD'C'D + AB'CD'$$

$$(F')' = (AB + C'D' + A'B'C'D + AD'C'D + AB'CD')'$$

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

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AB \ CD	00	01	11	10
00	1	0	0	0
01	0	1	0	0
11	0	0	1	0
10	0	0	0	1

SOP

$$F = A'B'C'D' + A'B'C'D + ABCD + AB'CD'$$

POS

$$F' = A'C + AC' + A'B'C'D' + A'B'C'D + AB'CD + ABCD'$$

$$(F')' = (A'C + AC' + A'B'C'D' + A'B'C'D + AB'CD + ABCD')'$$

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

4. Truth table

S	X ₀	X ₁	Z
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1

X ₀ X ₁ \ S	00	01	11	10
0	0	0	1	1
1	0	1	1	0

SOP

$$F = X_0S' + X_1S$$

POS

$$F' = X_0'S' + X_1'S$$

$$(F')' = (X_0'S' + X_1'S)'$$

$$F = (X_0 + S)(X_1 + S')$$

5.

$x_0 x_1 x_2$									
$s_1 s_0 x_3$		000	001	011	010	110	111	101	100
000		0	0	0	0	1	1	1	1
001		0	0	0	0	1	1	1	1
011		0	0	1	1	1	1	0	0
010		0	0	1	1	1	1	0	0
110		0	0	0	0	0	0	0	0
111		1	1	1	1	1	1	1	1
101		0	1	1	0	0	1	1	0
100		0	1	1	0	0	1	1	0

SOP

$$F = x_0 s_1' s_0' + x_1 s_1' s_0' + x_3 s_1 s_0 + x_2 s_1 s_0'$$