4.6 (a) Of the four possible combination of d_1 & d_5. ($d_1 = 1$, $d_5 = 0$) give the best result.

$F = A'B'C' + A'B'C + ABC' + ABC = A'B' + AB.$

(b) By inspection, $G = C$ when both don't care set to 0.

4.7 (a) $F = A'B'C + A'BC' + AB'C' = \sum m(1, 2, 4)$

(b) Remaining term are maxterms :

$F = \prod M(0, 3, 5, 6, 7) = (A+B+C)(A+B'+C')(A'+B+C')(A'+B'+C)(A'+B'+C')$

4.13.

A	B	C	D	Z
0	0	0	0	1
0	0	0	1	1
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	1
1	0	0	0	1
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	1
1	1	1	1	1

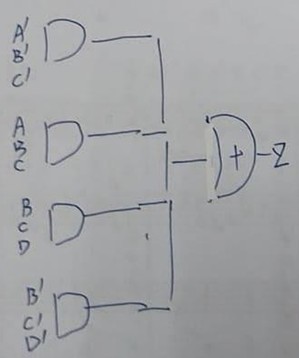
$Z = A'B'C'D' + A'B'C'D + AB'C'D' + ABCD' + ABCD + A'BCD$

$= A'B'C' + ABC + AB'C'D' + A'BCD$

$= A'B'C' + ABC + AB'C'D' + A'BCD + \underline{BCD} + B'C'D'$

(Add concensus terms.)

$\therefore Z = A'B'C' + ABC + BCD + B'C'D'$



4.16.

X_3	X_2	X_1	X_0	Z	Y_1	Y_0
0	0	0	0	0	X	X
0	0	0	1	1	0	0
0	0	1	0	1	0	1
0	0	1	1	1	0	1
0	1	0	0	1	1	0
0	1	0	1	1	1	0
0	1	1	0	1	1	0
0	1	1	1	1	1	0
1	0	0	0	1	1	1
1	0	0	1	1	1	1
1	0	1	0	1	1	1
1	0	1	1	1	1	1
1	1	0	0	1	1	1
1	1	0	1	1	1	1
1	1	1	0	1	1	1
1	1	1	1	1	1	1

ⓐ minterms of Z : 1, 2, 3, ... 15

minterms of Y_1 : 4, 5, 6, 7, 8, 9
10, 11, 12, 13, 14, 15

don't care : 0

minterms of Y_0 : 2, 3, 8, 9, 10
11, 12, 13, 14, 15

don't care : 0

ⓑ maxterms of Z : 0.

maxterms of Y_1 : 1, 2, 3

don't care : 0

maxterms of Y_0 : 1, 4, 5, 6, 7

don't care : 0.

4.20 $Z = AB + AC + BC$

4.26.

A	B	C	D	F	G	H	J
0	0	0	0	0	1	0	0
0	0	0	1	0	1	0	0
0	0	1	0	0	1	0	0
0	0	1	1	0	0	0	0
0	1	0	0	0	1	0	1
0	1	0	1	1	0	0	0
0	1	1	0	0	0	0	0
0	1	1	1	1	0	1	0
1	0	0	0	0	1	0	1
1	0	0	1	0	0	0	0
1	0	1	0	1	0	0	0
1	0	1	1	1	0	1	0
1	1	0	0	0	0	0	1
1	1	0	1	1	0	1	1
1	1	1	0	1	0	1	1
1	1	1	1	1	0	1	0

ⓐ $F(A, B, C, D)$
$= \sum m(5, 7, 10, 11, 13, 14, 15)$
$= \prod M(0, 1, 2, 3, 4, 6, 8, 9, 12)$

ⓑ $G(A, B, C, D)$
$= \sum m(0, 1, 2, 4, 8)$
$= \prod M(3, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15)$

ⓒ $H(A, B, C, D)$
$= \sum m(7, 11, 13, 14, 15)$
$= \prod M(0, 1, 2, 3, 4, 5, 6, 8, 9, 10, 12)$

ⓓ $J(A, B, C, D)$
$= \sum m(4, 8, 12, 13, 14)$
$= \prod M(0, 1, 2, 3, 5, 6, 7, 9, 10, 11, 15)$

4.39.

Notice: that the sign bit X_3 of the 4-bit number is extended to leftmost full adder as well.