2.1

(a)

xyz	x + y + z	(x + y + z)′	x′	y′	z′	x′y′z′
0 00	0	1	1	1	1	1
0 0 1	1	0	1	1	0	0
0 10	1	0	1	0	1	0
0 1 1	1	0	1	0	0	0
100	1	0	0	1	1	0
1 0 1	1	0	0	1	0	0
1 1 0	1	0	0	0	1	0
1 1 1	1	0	0	0	0	0

xyz	(xyz)	(xyz)′	x′	y′	z′	x′ + y′ + .
000	0	1	1	1	1	1
001	0	1	1	1	0	1
0 1 0	0	1	1	0	1	1
0 1 1	0	1	1	0	0	1
1 0 0	0	1	0	1	1	1
1 0 1	0	1	0	1	0	1
1 1 0	0	1	0	0	1	1
1 1 1	1	0	0	0	0	0

(b)

xyz	x + yz	(x + y)	{x + z)	{x + y)(x + z)
000	0	0	0	0
0 0 1	0	0	1	0
0 1 0	0	1	0	0
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	1

(c)

xyz	x(y + z)	xy	xz	xy + xz
0 00	0	0	0	0
0 0 1	0	0	0	0
0 1 0	0	0	0	0
0 1 1	0	0	0	0
100	0	0	0	0
10 1	1	0	1	1
1 1 0	1	1	0	1
1 1 1	1	1	1	1

(d)

xyz	x	y + z	x + (Y + z)	{x + y)	(x + y) + z
000	0	0	0	0	0
0 0 1	0	1	1	0	1
0 1 0	0	1	1	1	1
0 1 1	0	1	1	1	1
1 0 0	1	0	1	1	1
1 0 1	1	1	1	1	1
1 1 0	1	1	1	1	1
1 1 1	1	1	1	1	1

(e)

xyz	yz	x(yz)	xy	(xy)z
000	0	0	0	0
00 1	0	0	0	0
0 1 0	0	0	0	0
0 1 1	1	0	0	0
1 0 0	0	0	0	0
1 0 1	0	0	0	0
1 1 0	0	0	1	0
1 1 1	1	1	1	1

2.4 (a) $A'C' + ABC + AC' = C' + ABC = (C + C')(C' + AB) = AB + C'$

(b) $(xy' + z)' + z + xy + wz = (xy')'z' + z + xy + wz = [(x + y)z' + z] + xy + wz =$
$= (z + z')(z + x + y) + xy + wz = z + wz + x + xy + y = z(J + w) + x(J + y) + y = x + y + z$

(c) $A'B(D' + C'D) + B(A + A'CD) = B(A'D' + A'C'D + A + A'CD)$
$= B(A'D' + A + A'D(C + C') = B(A + A'(D' + D)) = B(A + A') = B$

(d) $(A' + C)(A' + C')(A + B + C'D) = (A' + CC')(A + B + C'D) = A'(A + B + C'D)$
$= AA' + A'B + A'C'D = A'(B + C'D)$

(e) $ABCD + A'BD + ABC'D = ABD + A'BD = BD$

2.11 **(a)** $F(x, y, z) = (1,$

(b) $F(a, b, c) = (0,$

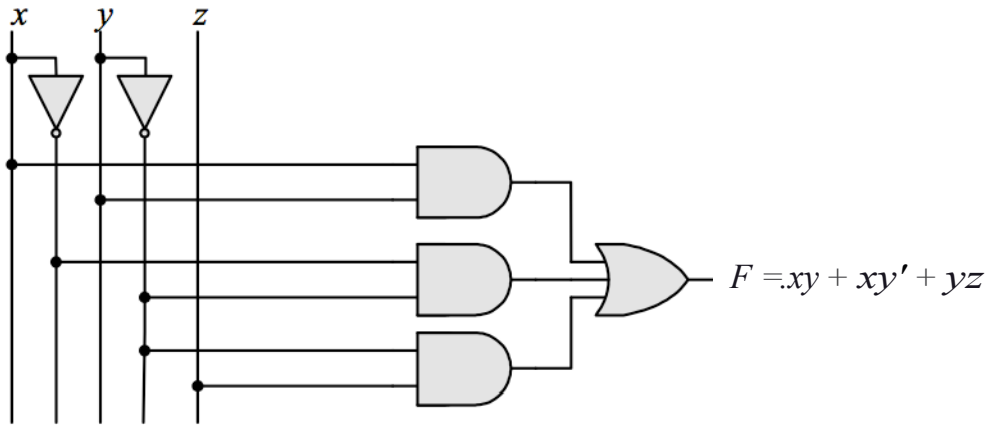
$F = xy + xy' + yz$

xyz	F
000	0
001	1
010	0
011	0
100	1
101	1
110	1
111	1

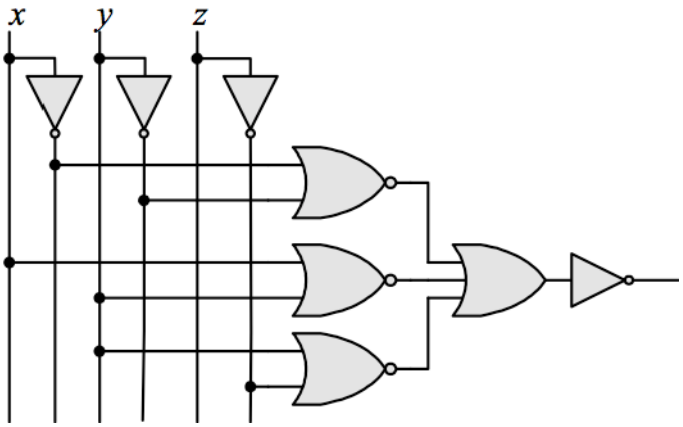
$F = a'c' + bc$

abc	F
000	1
001	0
010	1
011	1
100	0
101	0
110	0
111	1

2.14 (a)



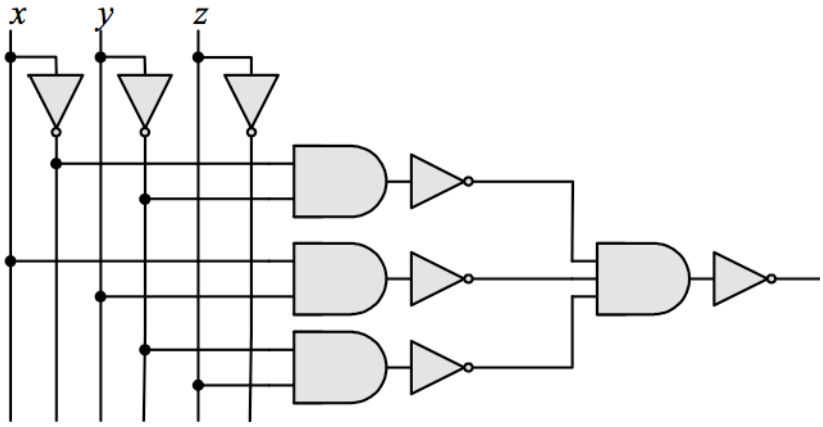
(b)



$F = xy + x'y' + y'z$

$= (x' + y')' + (x + y)' + (y + z')'$

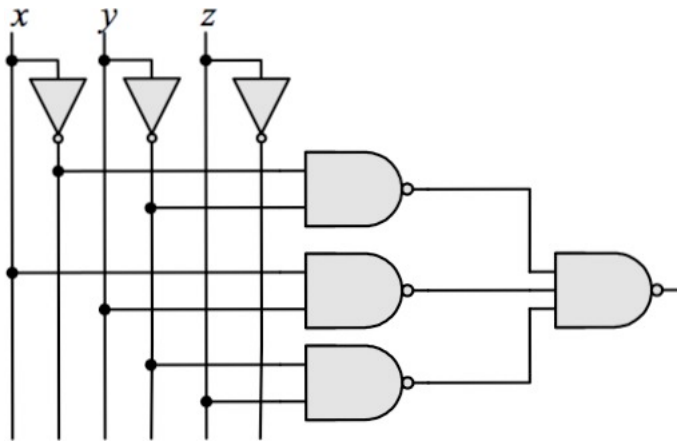
(c)



$F = xy + xy' + yz$

$= [(xy)'\,(xy)'\,(y'z)']'$

(d)



$F = xy + xy' + y'z$

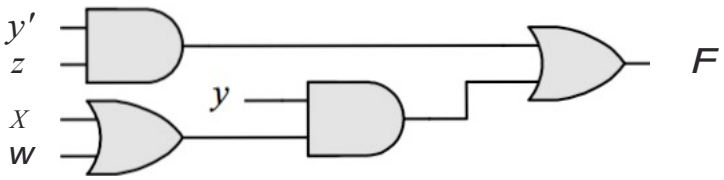
$= [(xy), (xy), (y'z)']'$

(c) $F = xy'z + xy'z + wX}' + wxy + wxy = y'z + xy + 11.y = yz + y(w + x)$

(d) $F = y'z + yw + yx) = L(I, 5, 9, 13, 10, 11, 13, 15, 6, 7, 14, 15)$

$= \text{L}(1, 5, 6, 7, 9, 10, 11, 13, 14, 15)$

(e)



1 – Inverter, 2 – Two-input AND gates, 2 – Two-input OR gates

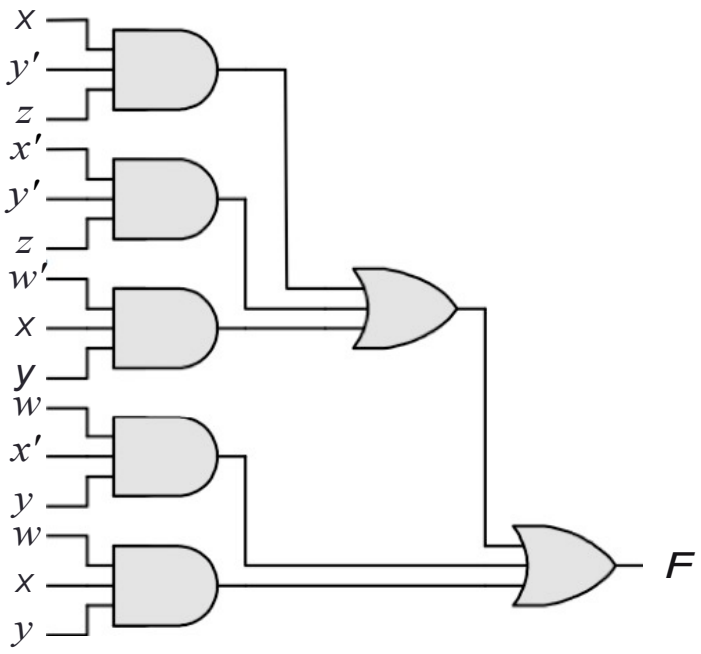
2.18 (a)

wxyz	F
000 0	0
00 0 1	1
0010	0
00 1 1	0
010 0	0
01 0 1	1
01 1 0	1
01 1 1	1
10 0 0	0
10 0 1	1
10 1 0	1
10 1 1	1
11 0 0	0
11 0 1	1
11 1 0	1
11 1 1	1

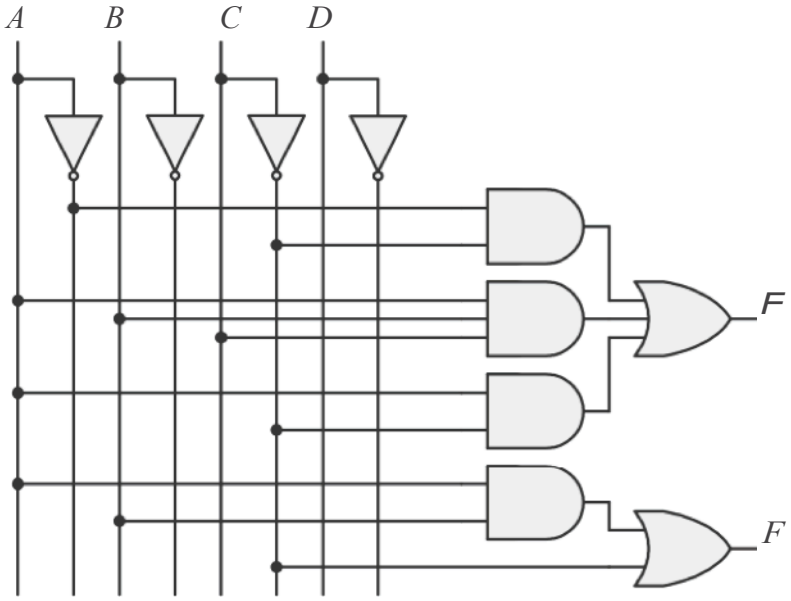
$F = xyz + xyz + wXji + wxy + wxy$

$F = \mathrm{L}(1, 5, 6, 7, 9, 10\ 11, 13, 14, 15)$

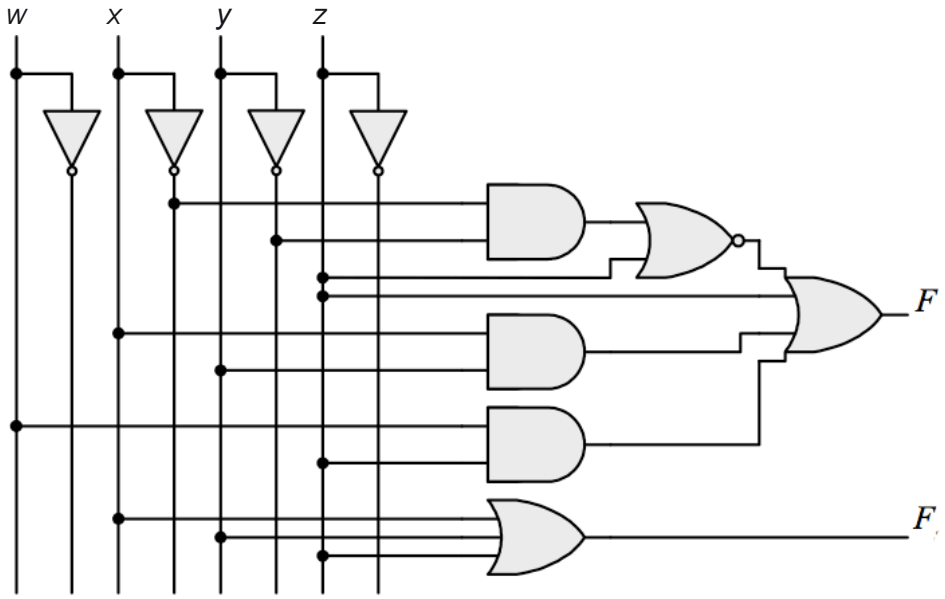
(b)



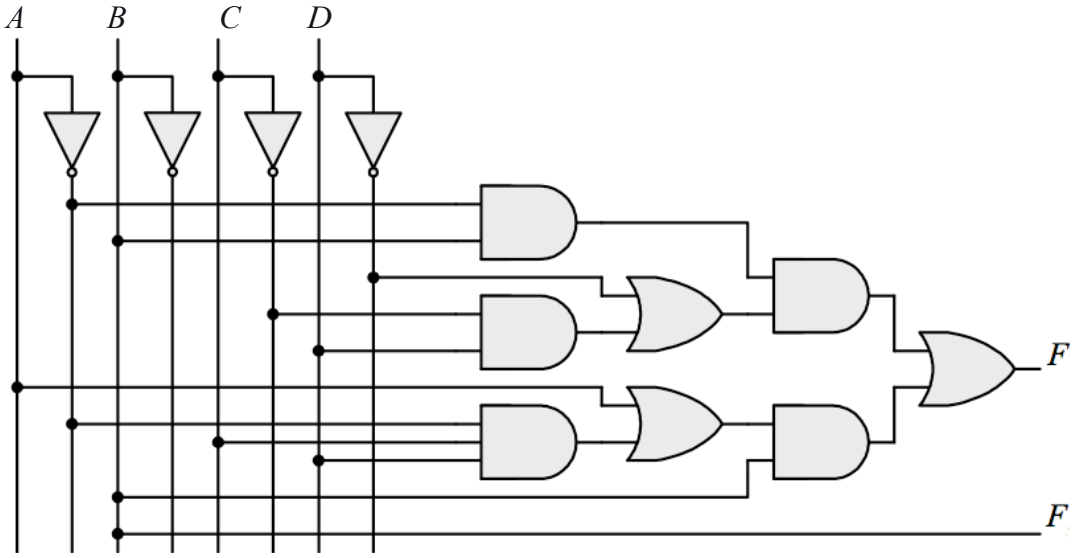
2.7 (a)



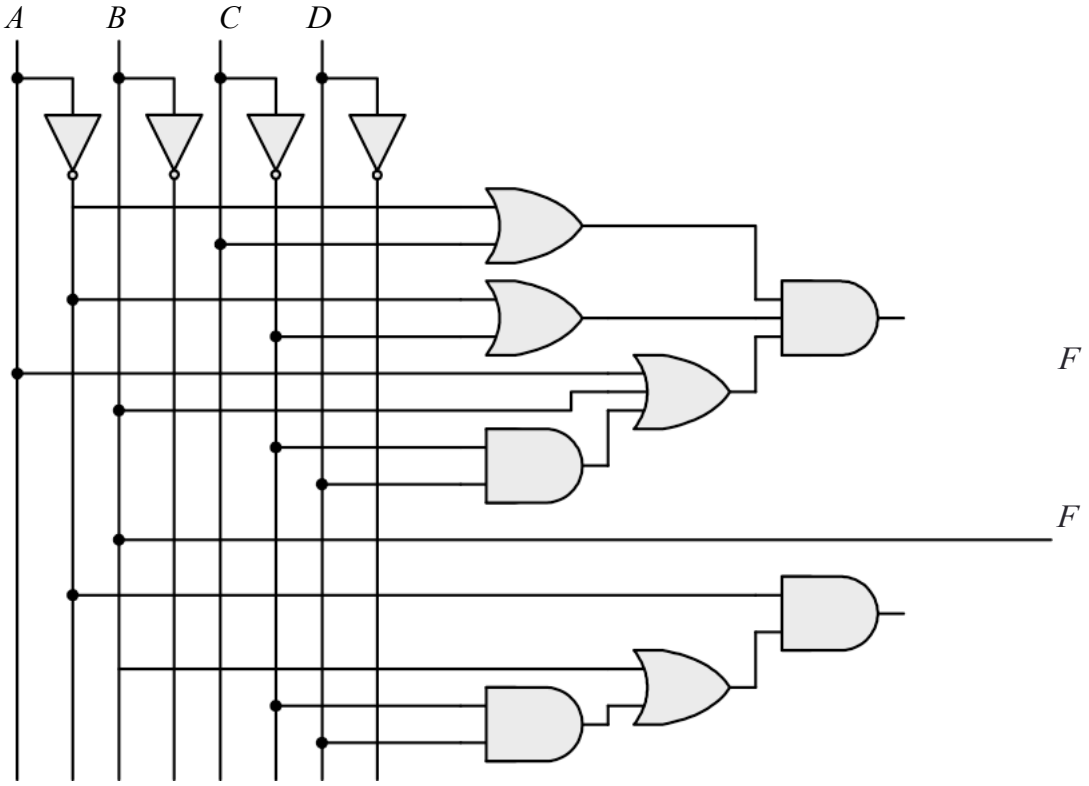
(b)



(c)



(d)



(e)