

3) 3.1 $S(x, y, z)$

$$b) = \sum (3, 5, 6, 7) \quad (1, 4, 7)$$

$x \backslash yz$	00	01	11	10
0	0	-	-	0
1	-	-	-	1

Annotations: A green circle highlights the cells (0,1), (0,11), (1,1), (1,11). A green line connects the top-right corner to the circle. A blue oval highlights the bottom row (x=1). A label 'x' points to the bottom row. A label 'z' points to the top-right corner.

$$S(x, y, z) = x + z$$

c) $f(a, b, c, d) = \sum (3, 8, 9, 14, 15$
 $(7, 2, 6, 11, 12, 13))$

$ab \backslash cd$	00	01	11	10
00	0	-	-	-
01	0	0	0	-
11	-	-	1	1
10	1	1	-	0

Annotations: A blue oval highlights the bottom row (ab=11), labeled 'a · b'. A red oval highlights the bottom-left cell (ab=10, cd=00), labeled 'a · c'. A green line connects the top-right corner to the cell (01, 11). A green line connects the bottom-right corner to the cell (11, 11), labeled 'b' · d'.

$$f(a, b, c, d) = a \cdot b + a \cdot c + b' \cdot d$$

$$= a \cdot (c' + b) + b' \cdot d$$

e) $h(a, b, c, d) = \prod_{cd} (0, 1, 2, 3, 10, 15 (6, 11, 12, 14))$

ab \ cd	00	01	11	10
00	0	0	0	0
01	1	1	1	—
11	—	1	0	—
10	1	1	—	0

$(d + b)$

$(a' + c')$

$$h(a, b, c, d) = (a + b) \cdot (a' + c')$$

d) $g(a, b, c, d) = b' \cdot (a' + d') + a \cdot c' + a' \cdot b' \cdot (c + d)$

$$= \underbrace{a' \cdot b'}_{(00--)} + \underbrace{b' \cdot d'}_{(-0-0)} + \underbrace{a \cdot c'}_{(1-0-)} + \underbrace{a' \cdot b' \cdot c}_{(001-)} + \underbrace{a' \cdot b' \cdot d}_{(00-1)}$$

ab \ cd	00	01	11	10
00	1	1	1	1
01	0	0	0	0
11	1	1	0	0
10	1	1	0	1

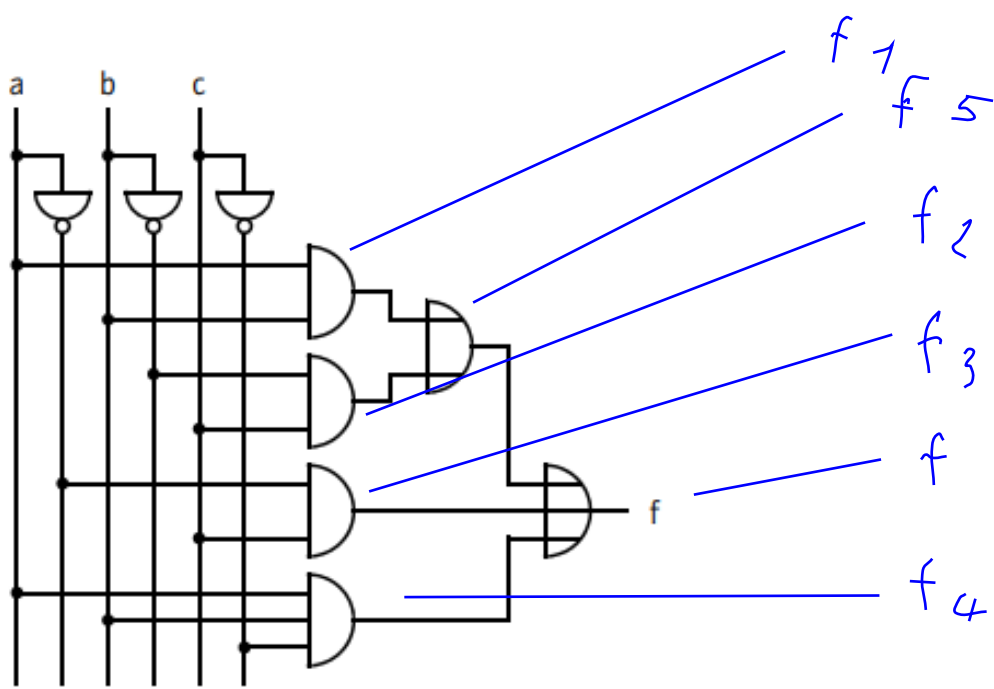
$a' \cdot b'$

$b' \cdot d'$

$a \cdot c'$

$$g(a, b, c, d) = a \cdot c' + b' \cdot d' + a' \cdot b'$$

3,2)



$$f = f_5 + f_4 + f_3$$

$$f_1 = a \cdot b$$

$$f_2 = b' \cdot c$$

$$f_3 = a' \cdot c$$

$$f_4 = a \cdot b \cdot c'$$

$$f_5 = f_1 + f_2$$

$$= a \cdot b + b' \cdot c$$

$$f = a \cdot b + b' \cdot c + a' \cdot b' \cdot c + a' \cdot b \cdot c'$$

(11-1) (-0-1) (101) (0-1)

a \ bc	00	01	11	10
0	0	1	1	0
1	0	1	1	1

$a \cdot b$
 c

$$f(a, b, c) = a \cdot b + c$$

