1a

$$x + (y \cdot z) = (x+y) \cdot (x+z)$$
$$f = (x+y) \cdot (x+z)$$
$$f = (x+y) \cdot x + (x+y) \cdot z$$
$$f = 1 \cdot x + xy + zx + zy$$
$$f = x \cdot (1 + y + z) + zy$$
$$\boxed{f = x + (yz)}$$

1b

x	y	z	f
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	1

✓

xy	xz	a	b	f
0	0	0	0	0
0	0	0	1	0
0	1	0	0	0
0	1	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	1	0	1
1	1	1	1	1

✓

2a

$$xy + yz + \bar{x}z = xy + \bar{x}z$$
$$f = xy + yz + \bar{x}z$$
$$f = xy + yz \cdot 1 + \bar{x}z$$
$$f = xy + yz(x + \bar{x}) + \bar{x}z$$
$$f = xy + yzx + \bar{x}yz + \bar{x}z$$
$$f = xy(1 + z) + \bar{x}z(1 + y)$$
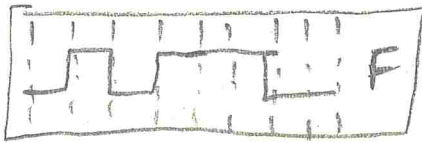$$\boxed{f = xy + \bar{x}z}$$

x	y	yz	$\bar{x}z$	f
0	0	0 0	1 0	0
0	0	0 1	1 1	1
0	1	1 0	1 0	0
0	1	1 1	1 1	1
1	0	0 0	0 0	0
1	0	0 1	0 1	0
1	1	1 0	0 0	1
1	1	1 1	0 1	1

✓

x	y	xy	$\bar{x}z$	f
0	0	1	1 0	0
0	0	1	1 1	1
0	1	1	1 0	0
0	1	1	1 1	1
1	0	0	0 0	0
1	0	0	0 1	0
1	1	1	0 0	1
1	1	1	0 1	1

✓

3.

X_3	X_2	X_1	a	b	c	d	F
0	0	0	1	1	0	0	0
0	0	1	1	0	1	0	1
0	1	0	0	1	0	0	0
0	1	1	0	1	0	1	1
1	0	0	1	0	1	0	0
1	0	1	1	0	1	0	1
1	1	0	0	0	0	0	0
1	1	1	0	0	0	0	0

4.
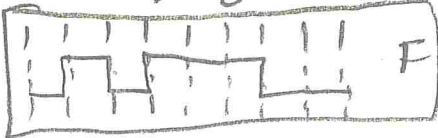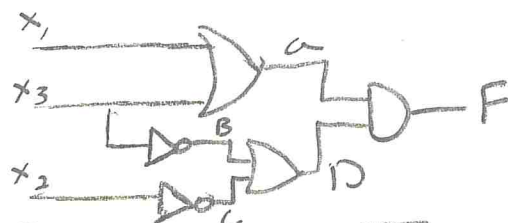
X_3	X_2	X_1	a	b	c	d	F
0	0	0	0	1	1	1	0
0	0	1	1	1	1	1	1
0	1	0	0	1	0	1	0
0	1	1	1	1	0	1	1
1	0	0	1	0	1	1	1
1	0	1	1	0	1	1	1
1	1	0	1	0	0	0	0
1	1	1	1	0	0	0	0