Lab: Boolean Logic (Solutions)

1.

SOP: A'B'C + A'BC + AB'C' + AB'C + ABC

K-map (AB along the top, C along the side):

	00	**01**	**11**	**10**
0	0	0	0	1
1	1	1	1	1

Tiles: tile of size four along the bottom, tile of size two along the right

Simplified: C + AB'

2.

SOP: A'B'C'D' + A'B'C'D + A'B'CD' + A'BC'D' + AB'C'D' + AB'C'D + AB'CD + ABC'D' + ABC'D + ABCD

K-map (AB along the top, CD along the side):

	00	**01**	**11**	**10**
00	1	1	1	1

01	1	0	1	1
11	0	0	1	1
10	1	0	0	0

Tiles: tile of size four along the top, tile of size four on the right in the middle, tile of size four along the left at the top and along the right at the top, tile of size two including the bottom left corner and the top left corner.

Simplified: C'D' + AD + B'C' + A'B'D'

3.

SOP: A'B'CD' + A'B'CD + A'BC'D' + A'BCD' + AB'C'D

K-map (AB along the top, CD along the side):

	00	**01**	**11**	**10**
00	0	1	x	0
01	0	0	x	1
11	1	0	x	x
10	1	1	x	x

Tiles: tile of size four including the bottom left edge and the bottom right edge, tile of size four between the middle top edge and the middle bottom edge, tile of size four on the right in the middle

Simplified: B'C + AD + BD'

4.

Truth table:

A	B	C	D	out
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	1
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
1	0	1	0	0
1	0	1	1	0
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1

1	1	1	1	0

SOP: A'BC'D' + AB'C'D' + AB'C'D + ABC'D' + ABC'D + ABCD'

K-map (AB across the top, CD along the left):

	00	**01**	**11**	**10**
00	0	1	1	1
01	0	0	1	1
11	0	0	0	0
10	0	0	1	0

Tiles: tile of size four in the upper right, tile of size two in the middle of the top edge, tile of size two including the square on the bottom with a 1 and the square three squares above that

Simplified: AC' + BC'D' + ABD'