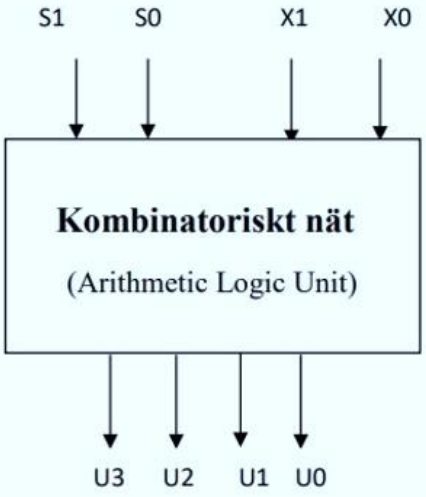
Yasir Riyadh Jabbar KTH/2020

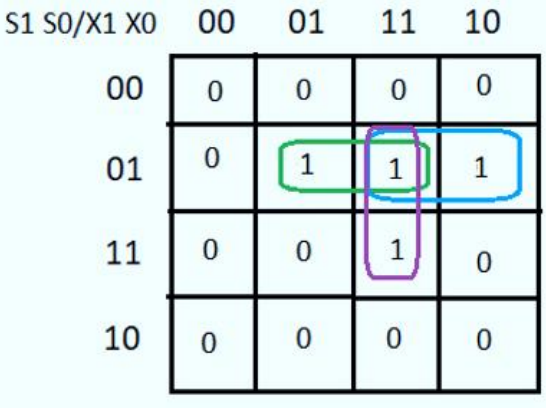
LAB 1

Överkursnivå Uppgift 1.

S_1S_0	U
00	X + 1 (Addition, inte OR)
01	-X (2-komplement)
10	X · 2
11	X^2

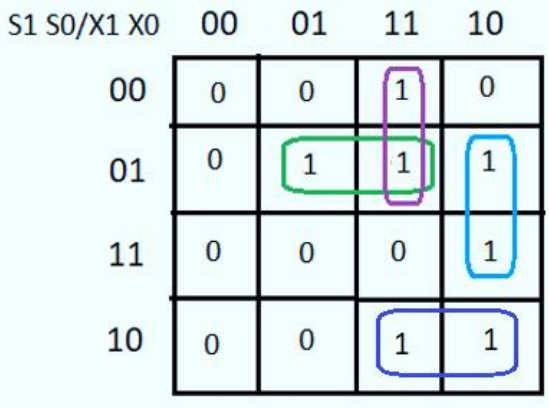


S1	S0	X1	X0	U3	U2	U1	U0
0	0	0	0	0	0	0	1
0	0	0	1	0	0	1	0
0	0	1	0	0	0	1	1
0	0	1	1	0	1	0	0
0	1	0	0	0	0	0	0
0	1	0	1	1	1	1	1
0	1	1	0	1	1	1	0
0	1	1	1	1	1	0	1
1	0	0	0	0	0	0	0
1	0	0	1	0	0	1	0
1	0	1	0	0	1	0	0
1	0	1	1	0	1	1	0
1	1	0	0	0	0	0	0
1	1	0	1	0	0	0	1
1	1	1	0	0	1	0	0
1	1	1	1	1	0	0	1



$U3 = S0\ X1\ X0 + \overline{S1}\ S0\ X0 + \overline{S1}\ S0\ X1$

$= S0\ X1\ X0 + \overline{S1}\ S0\ (X0 + X1)$



$U2 = \overline{S1}\ S0\ X0 + \overline{S1}\ X1\ X0 + S0\ X1\ \overline{X0} + S1\ \overline{S0}\ X1$

$= \overline{S1}\ X0\ (S0 + X1) + S0\ X1\ \overline{X0} + S1\ \overline{S0}\ X1$

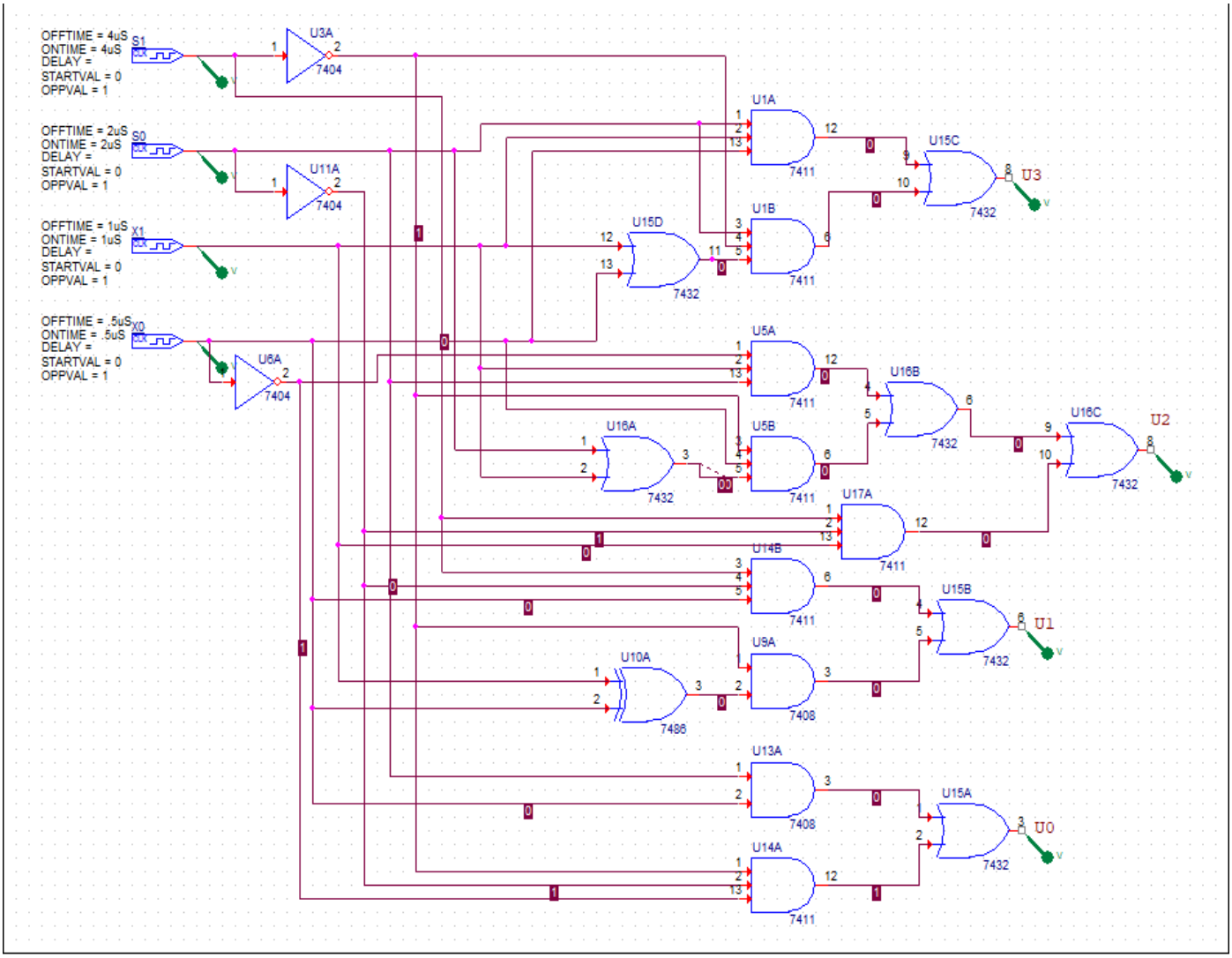
S1 S0/X1 X0	00	01	11	10
00	0	1	0	1
01	0	1	0	1
11	0	0	0	0
10	0	1	1	0

$$U1=\overline{S1}\ \overline{X1}\ X0+\overline{S1}\ X1\ \overline{X0}+S1\ \overline{S0}\ X0$$

$$=\overline{S1}\ (X1 \oplus X0)+S1\ \overline{S0}\ X0$$

S1 S0/X1 X0	00	01	11	10
00	1	0	0	1
01	0	1	1	0
11	0	1	1	0
10	0	0	0	0

$$U0=S0\ X0+\overline{S1}\ \overline{S0}\ \overline{X0}$$



LAB 1

Överkursnivå **Uppgift 2.** nätet konstrueras med enbart **NAND-grindar**.

$$U3=S0\ X1\ X0+\overline{S1}\ S0\ X0+\overline{S1}\ S0\ X1$$

$$=\overline{S0\ X1\ X0}\cdot\overline{\overline{S1}\ S0\ X0}\cdot\overline{\overline{S1}\ S0\ X1}$$

$$U2=\overline{S1}\ S0\ X0+\overline{S1}\ X1\ X0+S0\ X1\ \overline{X0}+S1\ \overline{S0}\ X1$$

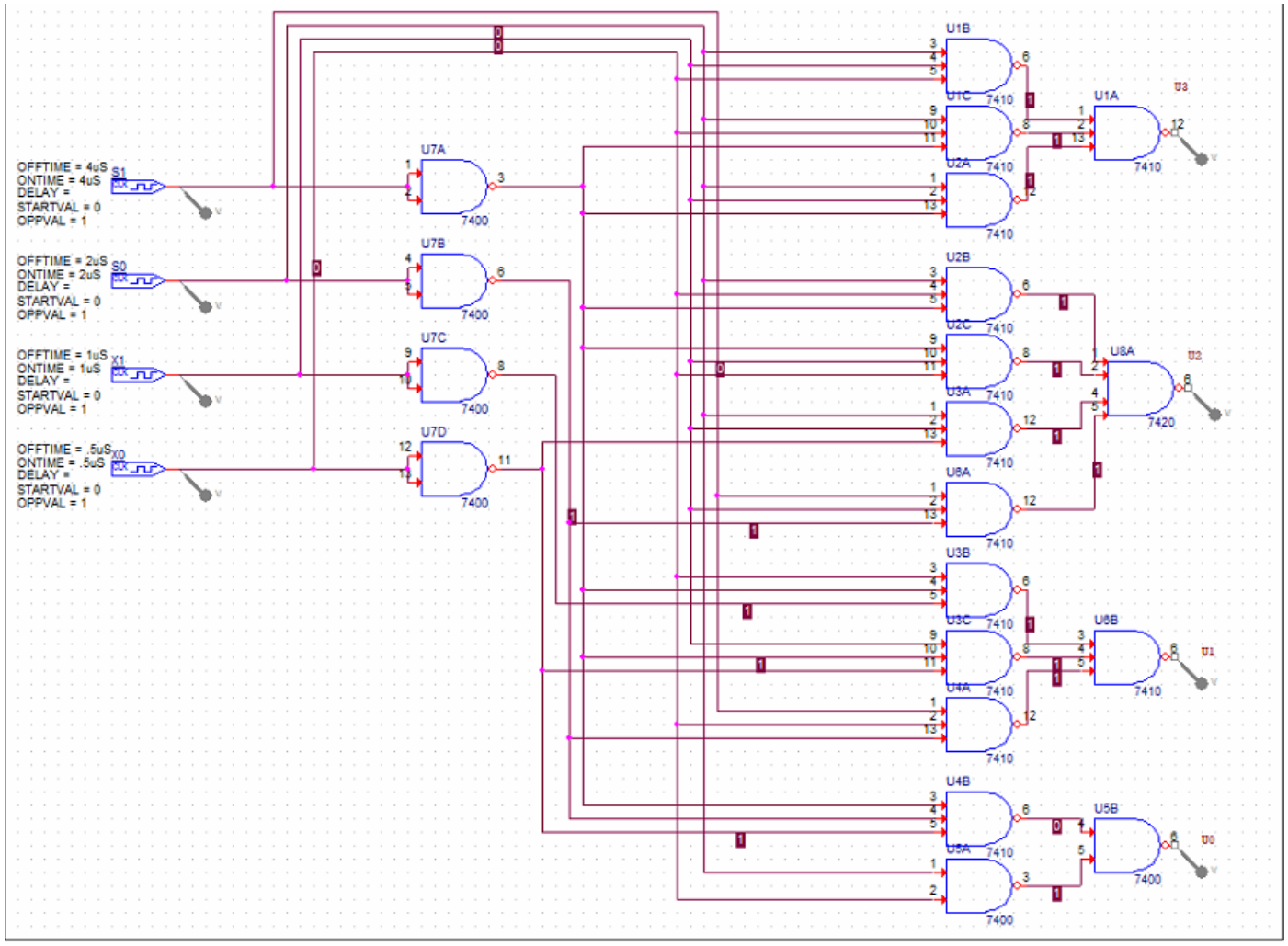
$$=\overline{\overline{S1}\ S0\ X0}\cdot\overline{\overline{S1}\ X1\ X0}\cdot\overline{S0\ X1\ \overline{X0}}\cdot\overline{S1\ \overline{S0}\ X1}$$

$$U1=\overline{S1}\ \overline{X1}\ X0+\overline{S1}\ X1\ \overline{X0}+\overline{S1}\ \overline{S0}\ X0$$

$$=\overline{\overline{S1}\ \overline{X1}\ X0}\cdot\overline{\overline{S1}\ X1\ \overline{X0}}\cdot\overline{\overline{S1}\ \overline{S0}\ X0}$$

$$U0=S0\ X0+\overline{S1}\ \overline{S0}\ \overline{X0}$$

$$=\overline{S0\ X0}\cdot\overline{\overline{S1}\ \overline{S0}\ \overline{X0}}$$


OFFTIME = 4uS
ONTIME = 4uS
DELAY =
STARTVAL = 0
OPPVAL = 1
S1
OFFTIME = 2uS
ONTIME = 2uS
DELAY =
STARTVAL = 0
OPPVAL = 1
S0
OFFTIME = 1uS
ONTIME = 1uS
DELAY =
STARTVAL = 0
OPPVAL = 1
X1
OFFTIME = .5uS
ONTIME = .5uS
DELAY =
STARTVAL = 0
OPPVAL = 1
X0
U7A
U7B
U7C
U7D
7400
U1B
U1C
U2A
U1A
U2B
U2C
U3A
U8A
U6A
U3B
U3C
U4A
U6B
U4B
U5A
U5B
7410
7420
U3
U2
U1
U0


Lab1_3U2 (active)
X0:1
X1:1
S0:1
S1:1
U5B:Y
U6B:Y
U8A:Y
U1A:Y
0s
0.5us
1.0us
1.5us
2.0us
2.5us
3.0us
3.5us
4.0us
4.5us
5.0us
5.5us
6.0us
6.5us
7.0us
7.5us
8.0us
TIME