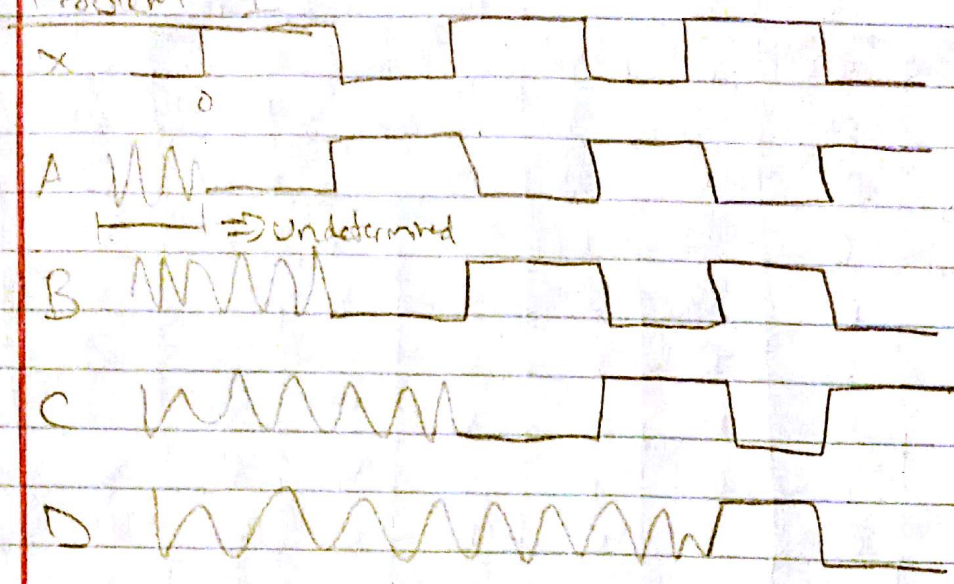
Rocky Lo
CSE 31-04L

HW8

Problem 1



Problem 2

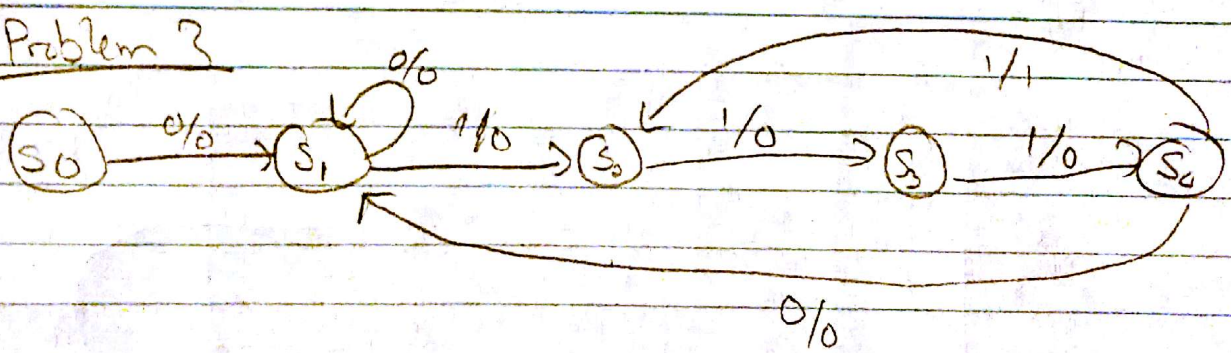
Delay: $2 \cdot 1 + 1 = 4$ ns

Time 2.5ns

- D > T ⇒ it will not function properly.
- To fix it, change the frequency to 250 MHz which will make the time period 4ns

Problem 3

1.



2.

P_{S1}	P_{S2}	P_{S3}	P_{S4}	I	N_{S1}	N_{S2}	N_{S3}	N_{S4}	Out
0	0	0	0	0	1	0	0	0	0
0	0	0	0	1	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0
1	0	0	0	1	0	1	0	0	0
0	1	0	0	0	0	0	1	0	1
0	1	0	0	1	0	0	0	0	0
0	0	1	0	0	0	0	0	1	1
0	0	1	0	1	0	0	0	0	0
0	0	0	1	0	1	0	0	0	0
0	0	0	1	1	0	1	0	0	1

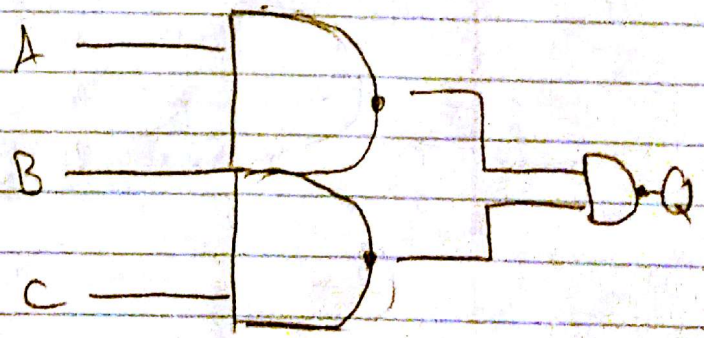
3. $y = \bar{a}b\bar{c} + \bar{a}b\bar{c} + a\bar{b}\bar{c} + \bar{a}bc + ab\bar{c} + abc$

$= \bar{a}(b\bar{c} + b\bar{c} + bc) + a(\bar{b}\bar{c} + b\bar{c} + bc)$

$= b\bar{c} + b\bar{c} + bc \Rightarrow \boxed{y = b + \bar{b}\bar{c}}$

Problem 4

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



Problem 5

$\bar{a}\bar{b}\bar{c}de + \bar{a}b\bar{c}\bar{d}e + \bar{a}b\bar{c}de + \bar{a}\bar{b}cd\bar{e} + \bar{a}bcde + ab\bar{c}\bar{d}e$
$+ a\bar{b}\bar{c}d\bar{e} + a\bar{b}\bar{c}de + ab\bar{c}\bar{d}e + ab\bar{c}d\bar{e} + abcde + abcd\bar{e}$
$+ a\bar{b}\bar{c}\bar{d}\bar{e} + ab\bar{c}de$

Problem 6

$y = \bar{a}\bar{b}\bar{c} + \bar{a}bc + \bar{a}b\bar{c} + abc$

$= \bar{a}\bar{b}c + \bar{a}(b\bar{c} + bc) + a(b\bar{c} + bc)$

$= a\bar{b}\bar{c} + (\bar{a} + a) + (b\bar{c} + bc)$

$= a\bar{b}\bar{c} + b(c + \bar{c}) \Rightarrow \boxed{y = \bar{a}\bar{b}\bar{c} + b}$