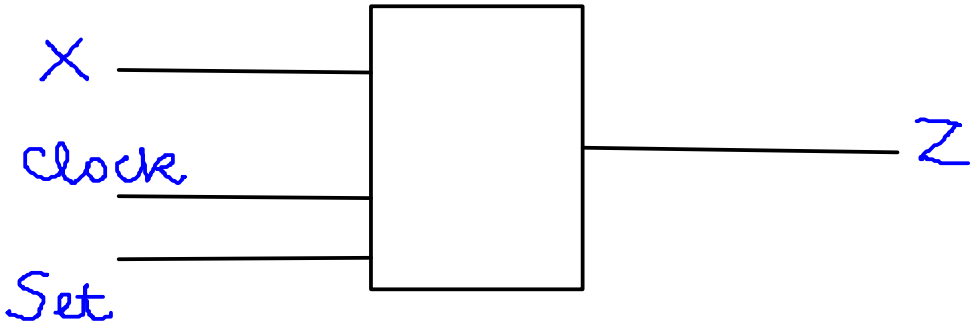
Design of sequential circuits

Examples

Example 1. Stream 2's complimenter



lsb

1 1 0 0 1 1 1 0 0 → 0 0 1 1 0 0 1 0 0

2's compliment

lead sequence

lsb

lsb

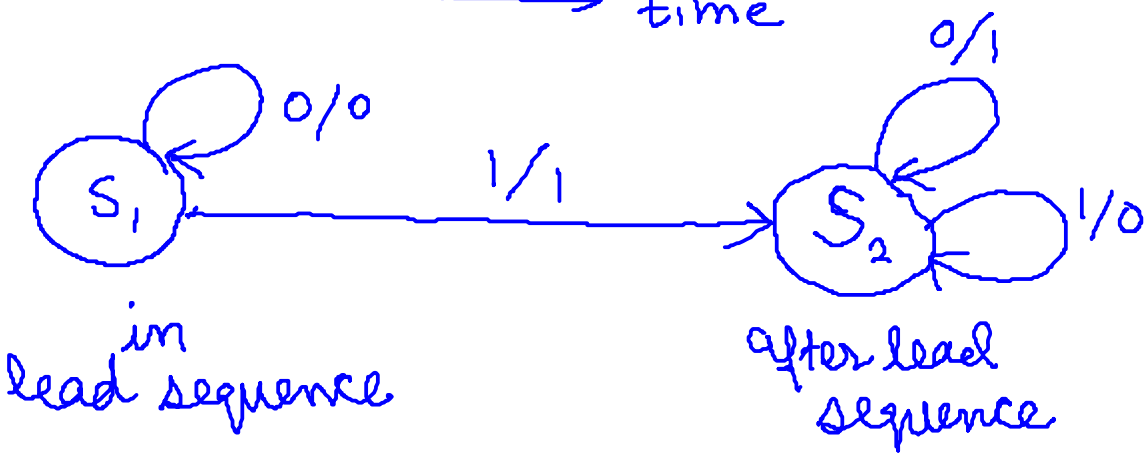
0 0 1 1 1 0 0 1 1 X

→ time

Z ? 0 0 1 0 0 1 1 0 0

lsb

→ time



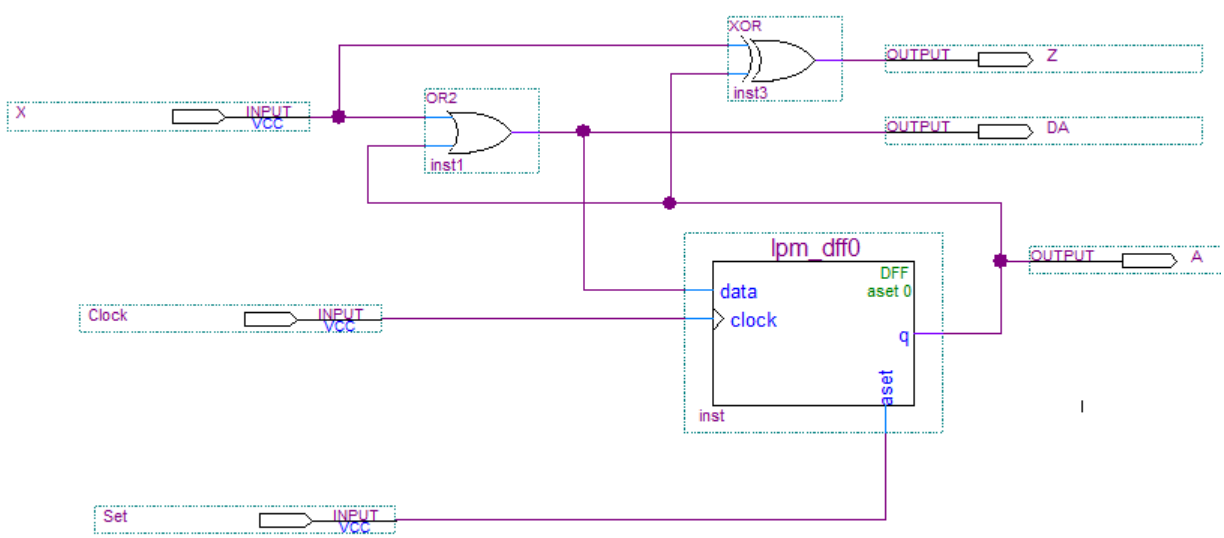
Present State	X	Next State	output Z
S_1	0	S_1	0
S_1	1	S_2	1
S_2	0	S_2	1
S_2	1	S_2	0

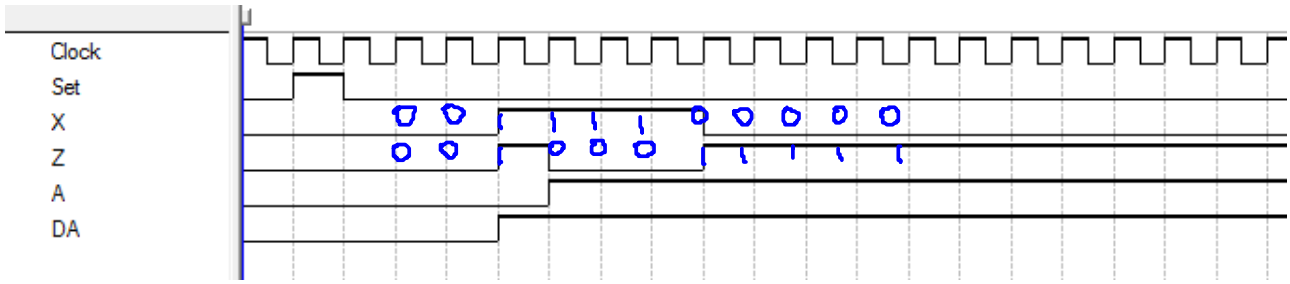
Encode states: $S_1 \rightarrow 0$ $S_2 \rightarrow 1$

one flipflop A

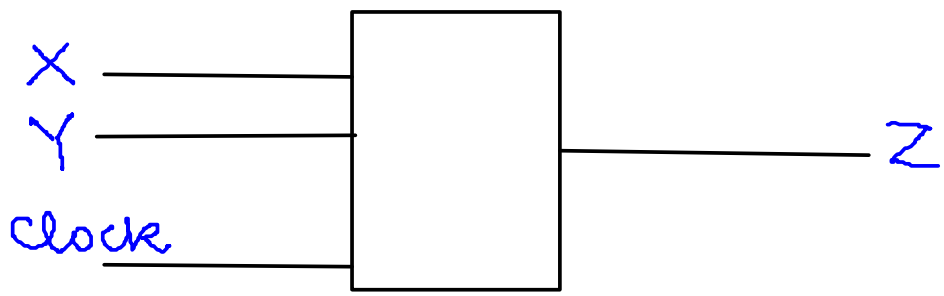
	Present State A	X	Next State D_A	output Z
m_0	0	0	0	0
m_1	0	1	1	1
m_2	1	0	1	1
m_3	1	1	1	0

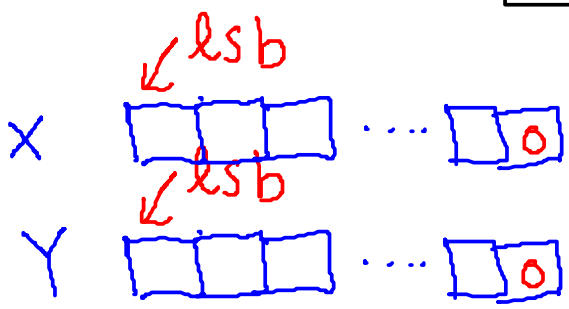
$D_A = A + X$ $Z = A \oplus X$

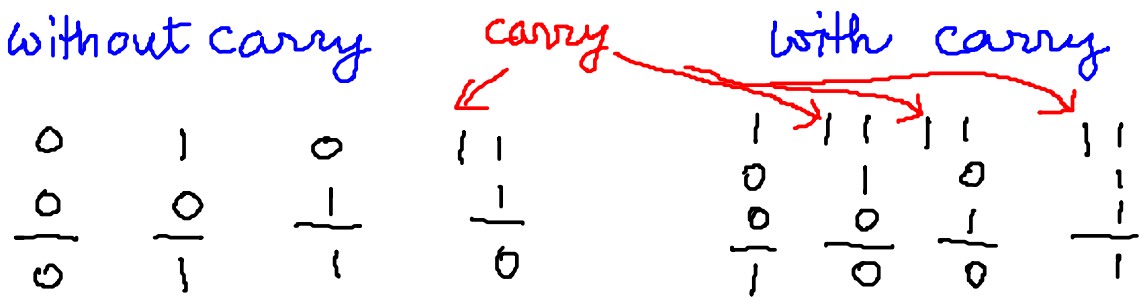


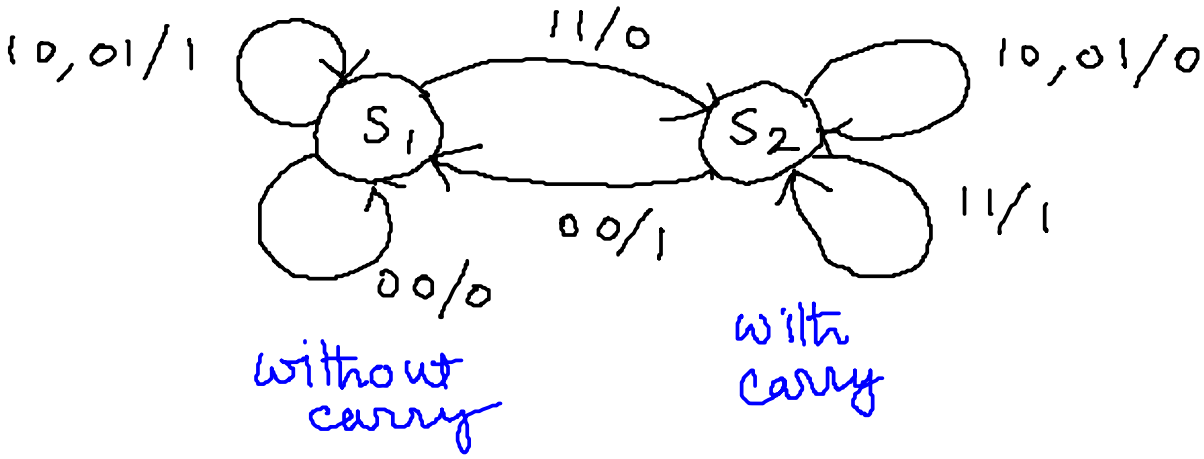


Example 2: Serial adder





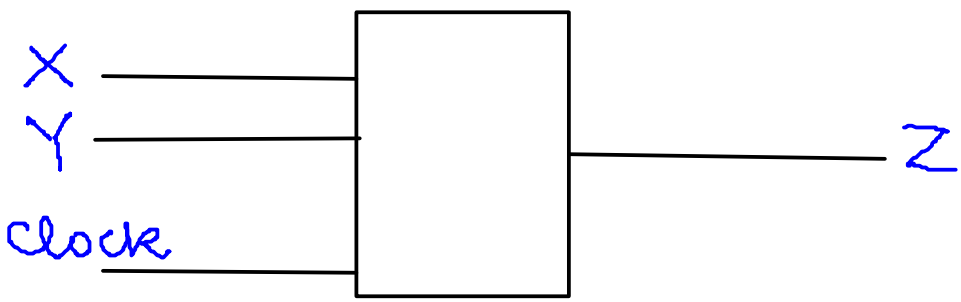


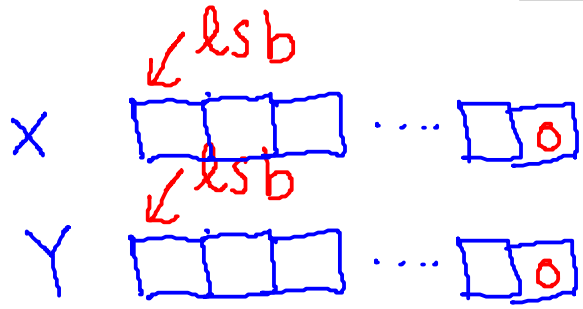


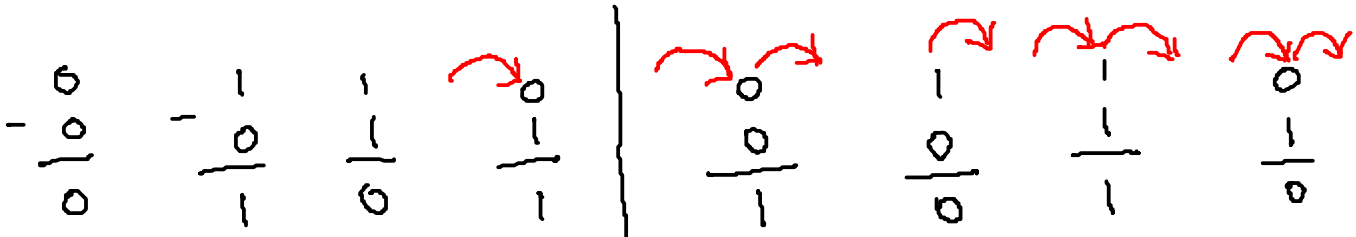
Prob.2 a complete the problem

state table, state encoding,
flip flop and output equations
simplify
logical circuit

Example 3 : serial subtractor

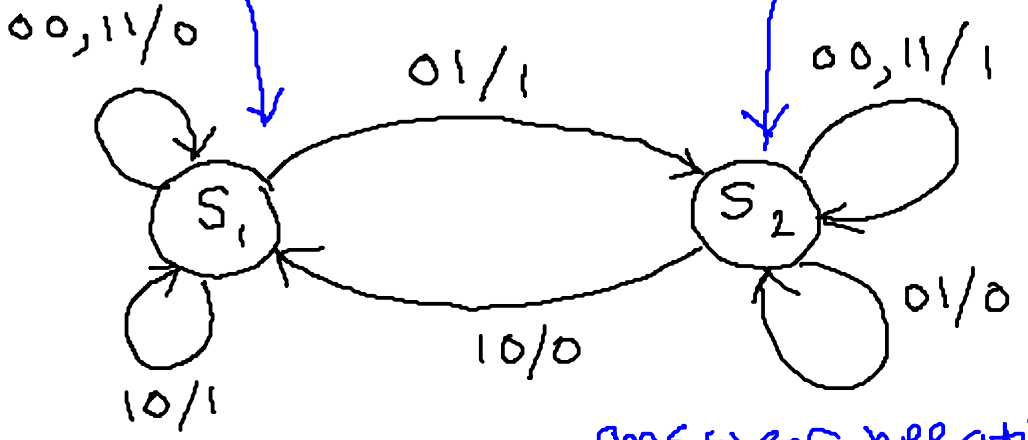






do not supply borrow

supply a borrow



problem ends in state S_2 → answer negative not reliable

Prob 2 (b) complete the problem

state table, state encoding,

flip flop and output equations

simplify

logical circuit