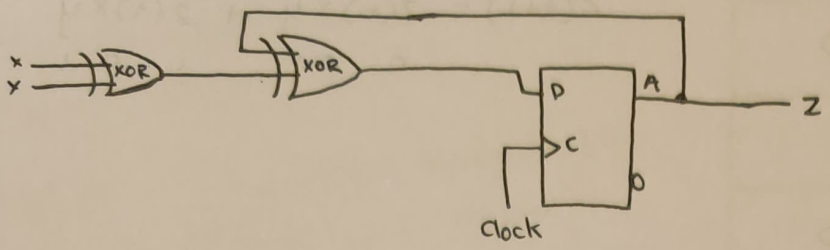
Assignment - 10

Question 1



input equation

$$D = Z(t) \oplus (x \oplus y)$$

Characteristic equation of D Flip Flop

D	Q(t+1)
0	0
1	1

$$Q(t+1) = D$$

State equation

A	B	XOR
0	0	0
0	1	1
1	0	1
1	1	0

A XOR B = (A OR B) AND (NOT (A AND B))

$$Z(t+1) = Z(t) \oplus (x \oplus y)$$

$$x \oplus y = (\bar{x} + \bar{y}) \cdot (x + y)$$

$$= (x + y) \cdot (\bar{x} \cdot \bar{y})$$

$$A(t+1) = Z(t) \oplus [(x+y) \cdot (\bar{x} \cdot \bar{y})]$$

$$= (Z(t) + x + y) \cdot (Z(t) + \bar{x} \cdot \bar{y})$$

$$x \oplus y = \bar{x}y + x\bar{y}$$

$$Z(t+1) = Z(t) \oplus \bar{x}y + x\bar{y}$$

$$= \bar{Z}(t)\bar{x}y + Z(t)\bar{x}y$$

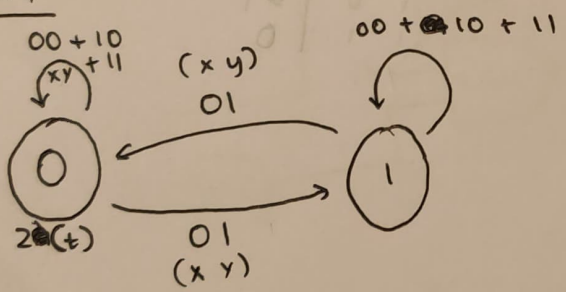
State table

z(t)	x	y	z(t+1)
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	0

→ One state : two combinations

$$z(t+1) = \bar{z}(t)\bar{x}y + z(t)\bar{x}y$$
$$0\ \ 01 \qquad 1\ \ 01$$

State diagram



Question 2

1.

```
d :: Bool -> Bool -> Bool
d q False = False
d q _     = True

dFlipFlop :: Stream Bool -> Stream Bool
dFlipFlop ds = tailStream qs where
    qs = fby not s (dds q ds)

dds :: Stream Bool -> Stream Bool -> Stream Bool
dds = lift2 d
```

2.