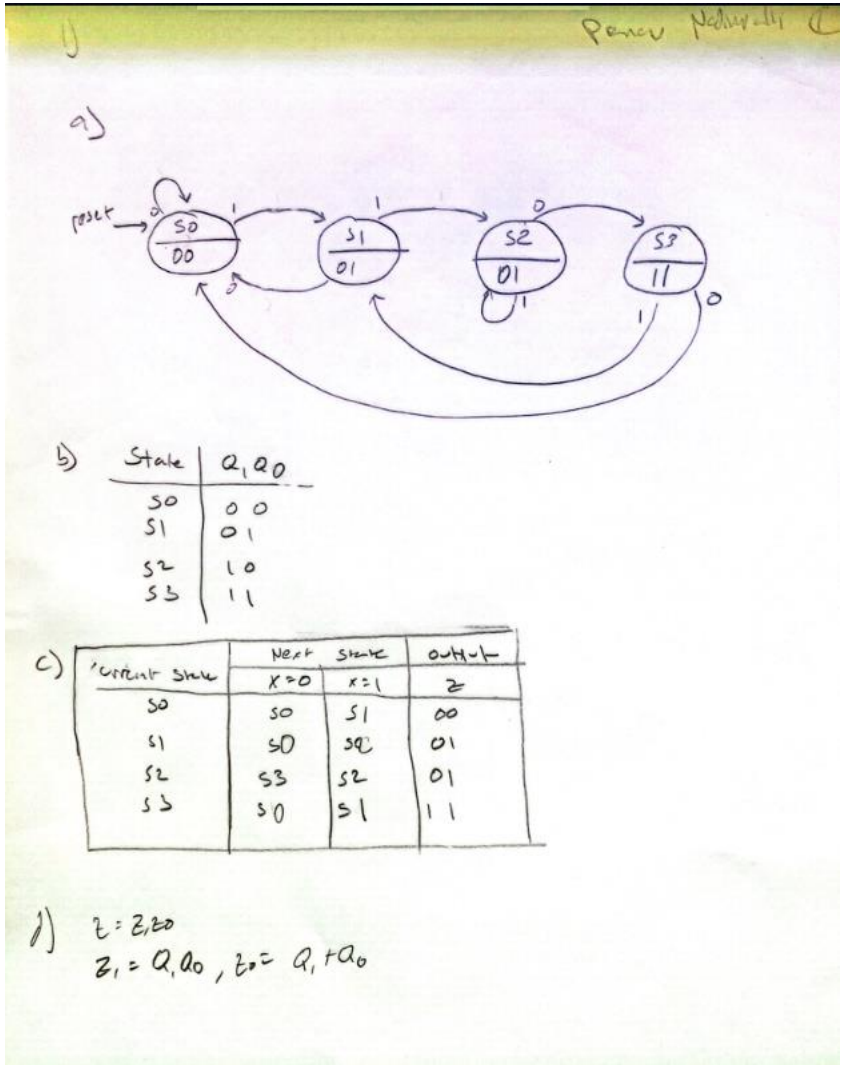
Homework 6

Pranav Nadimpalli

Problem 1 Moore Answers



1)

a)

b)

State	$Q_1 Q_0$
S0	0 0
S1	0 1
S2	1 0
S3	1 1

c)

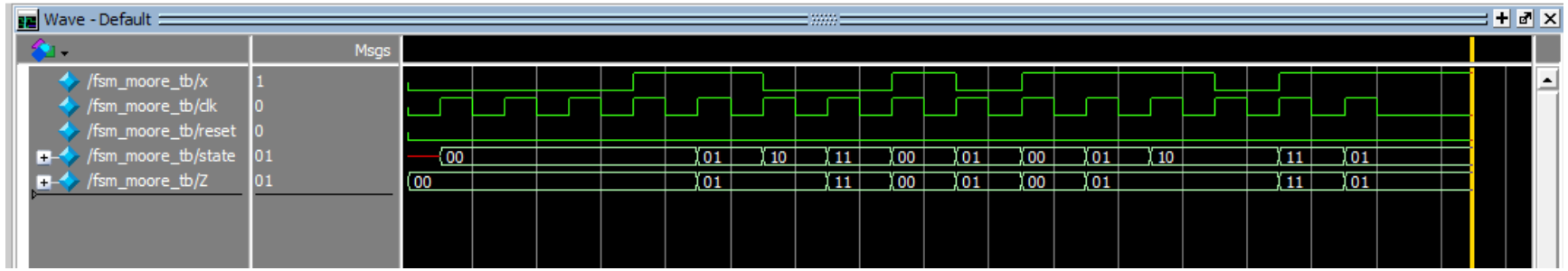
Current State	Next State		Output
	X=0	X=1	Z
S0	S0	S1	00
S1	S0	S2	01
S2	S3	S2	01
S3	S0	S1	11

d) $Z = Z_1 Z_0$

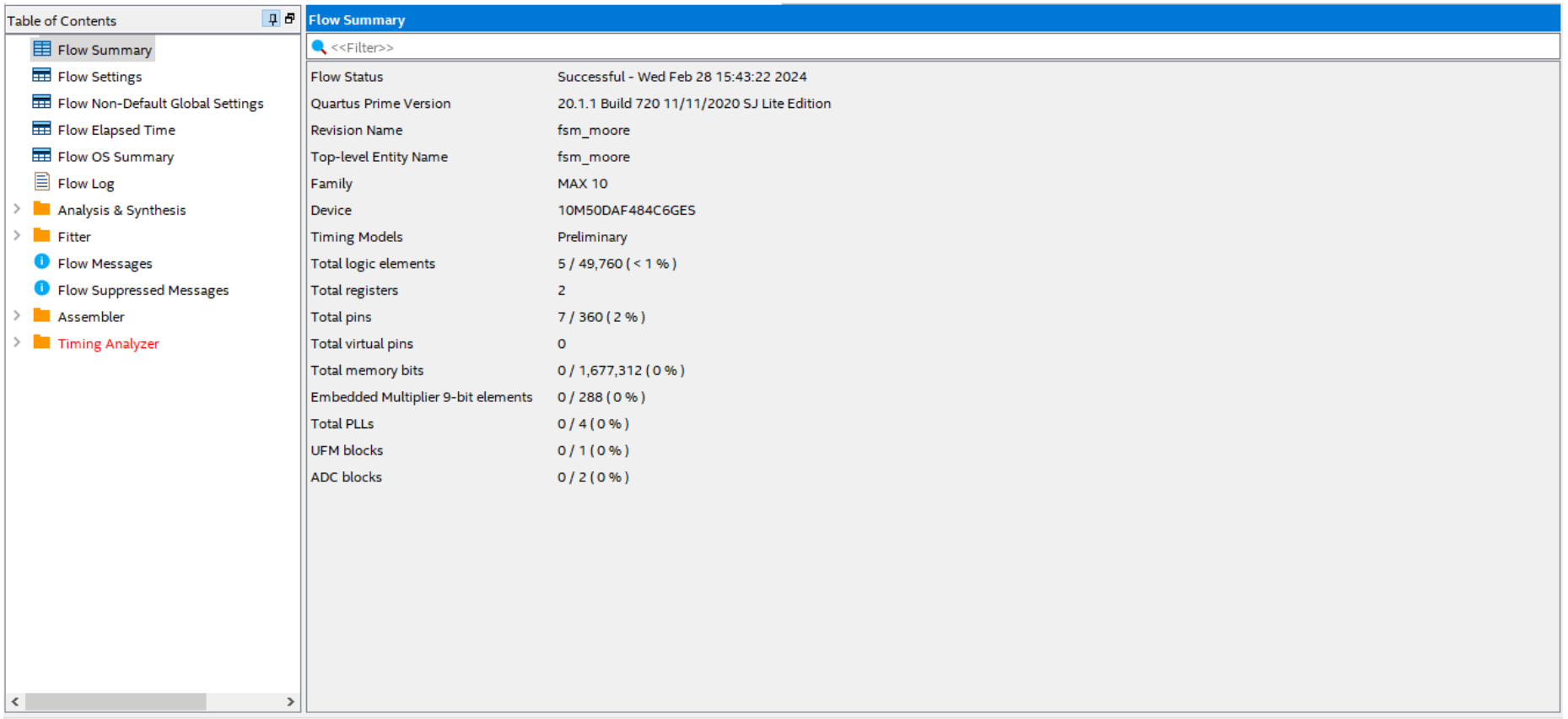
$Z_1 = Q_1 Q_0$, $Z_0 = Q_1 + Q_0$

Problem 2 Wave Forms + Transcript

```
/Z
VSIM 42> run
run
# State: 00, x: 0, Z: 00
run
run
# State: 00, x: 0, Z: 00
run
run
# State: 00, x: 0, Z: 00
run
run
# State: 00, x: 1, Z: 00
run
run
# State: 01, x: 1, Z: 01
run
run
# State: 10, x: 0, Z: 01
run
run
# State: 11, x: 0, Z: 11
run
run
# State: 00, x: 1, Z: 00
run
run
# State: 01, x: 0, Z: 01
run
run
# State: 00, x: 1, Z: 00
run
run
# State: 01, x: 1, Z: 01
run
run
# State: 10, x: 1, Z: 01
run
run
# State: 10, x: 0, Z: 01
run
run
# State: 11, x: 1, Z: 11
run
run
# State: 01, x: 1, Z: 01
run
run
VSIM 43> run
```

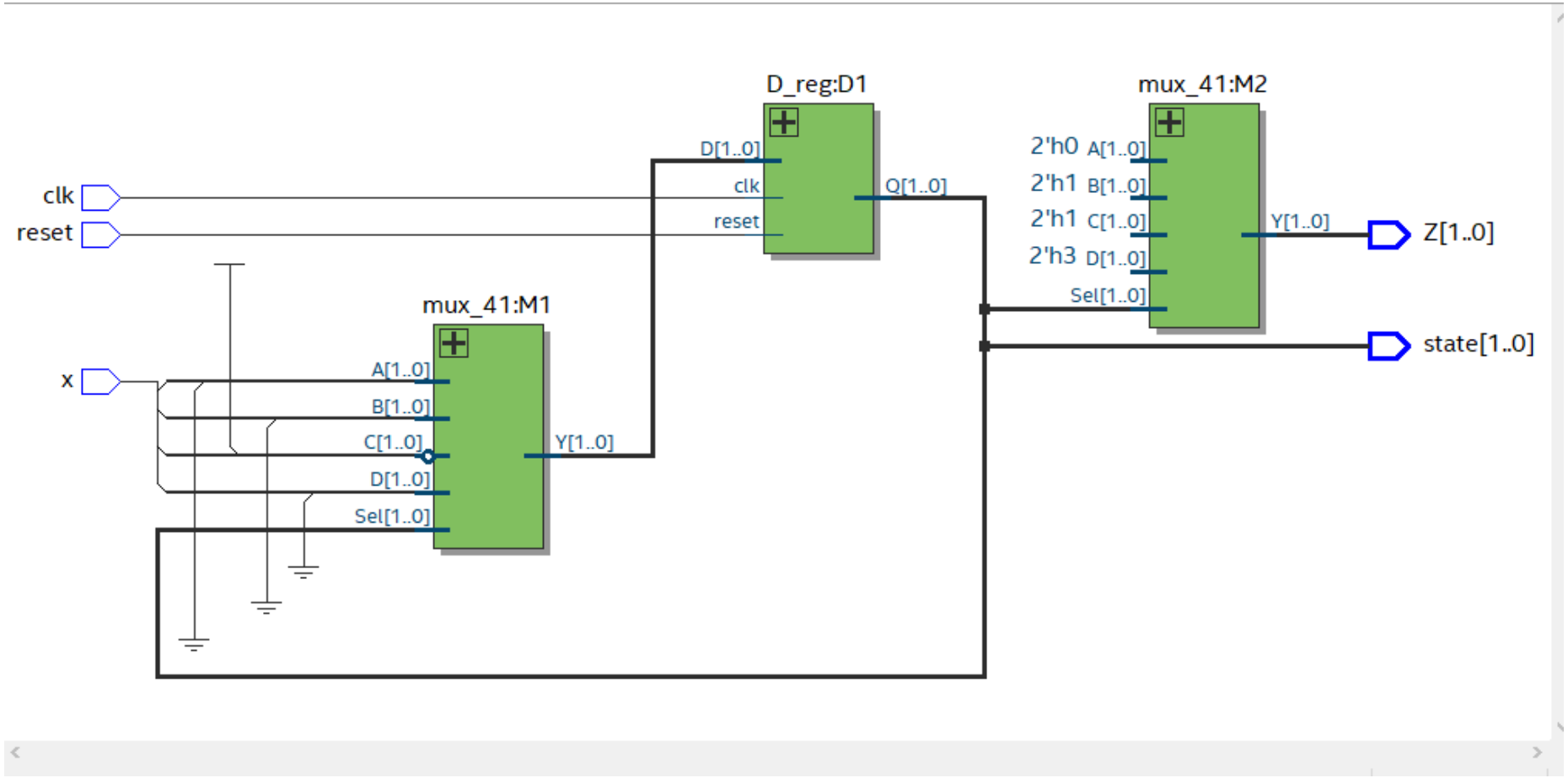


Problem 2 Moore Flow Summary

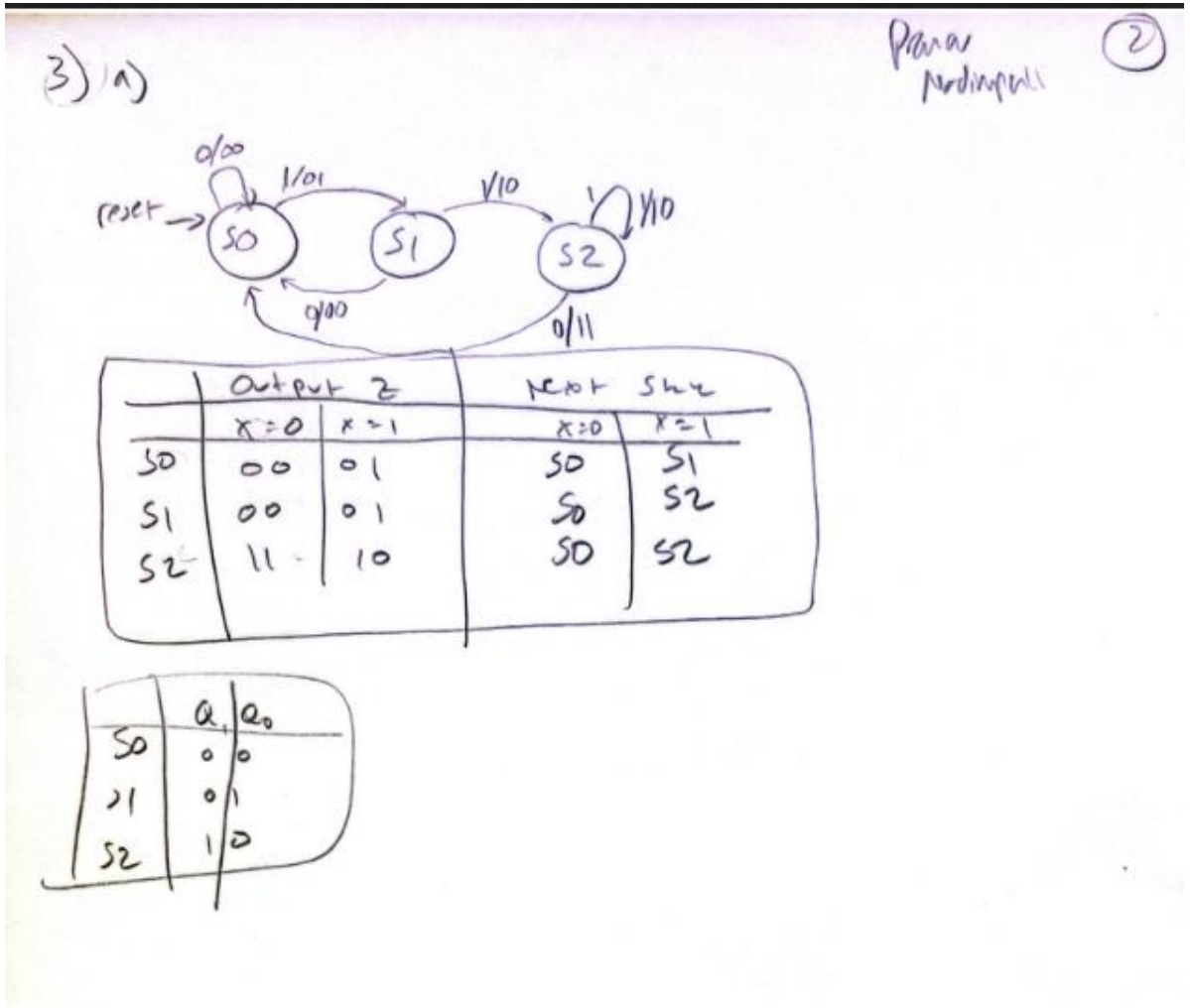


Problem 2 Moore Net List

- The main difference is that my output logic is made through a mux



Problem 3 Mealy Answers



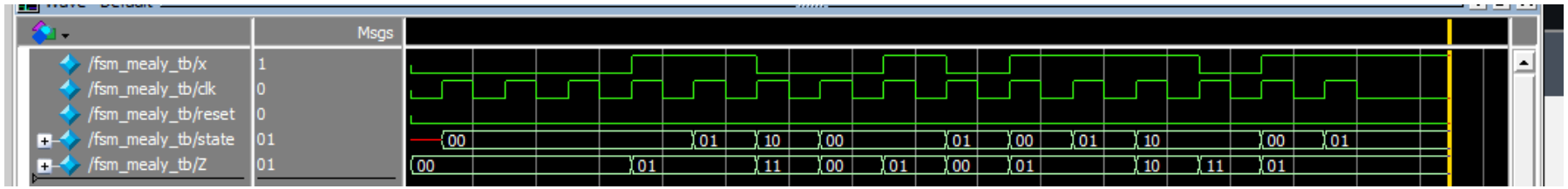
	Output Z		Next State	
	X=0	X=1	X=0	X=1
S0	00	01	S0	S1
S1	00	01	S0	S2
S2	11	10	S0	S2

	Q_1	Q_0
S0	0	0
S1	0	1
S2	1	0

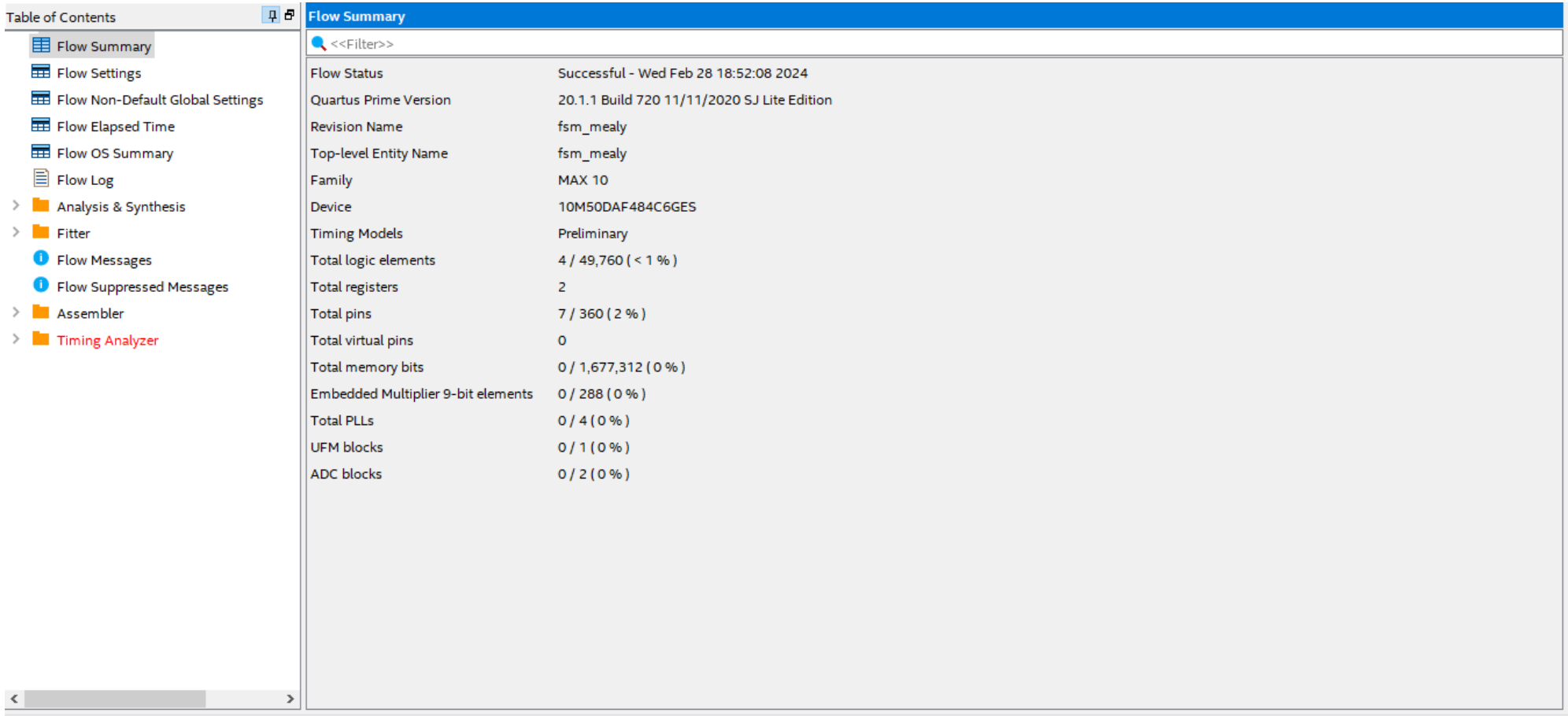
Problem 3 Mealy Transcript + Waveforms

```
add wave -position end  sim:/fsm_mealy_tb/Z
VSIM 21> run
run
# State: 00, x: 0, Z: 00
run
run
# State: 00, x: 0, Z: 00
run
run
# State: 00, x: 0, Z: 00
run
run
# State: 00, x: 1, Z: 01
run
run
# State: 01, x: 1, Z: 01
run
run
# State: 10, x: 0, Z: 11
run
run
# State: 00, x: 0, Z: 00
run
run
# State: 00, x: 1, Z: 01
run
run
# State: 01, x: 0, Z: 00
run
run
# State: 00, x: 1, Z: 01
run
run
# State: 01, x: 1, Z: 01
run
run
# State: 10, x: 1, Z: 10
run
run
# State: 10, x: 0, Z: 11
run
run
# State: 00, x: 1, Z: 01
run
run
# State: 01, x: 1, Z: 01
run
run
VSIM 22> run

VSIM 22>
```



Problem 3 Mealy Flow Summary



Problem 3 Mealy Net List

The main difference is that the output calculation involves the input X, and there is one less state in the design which should be expected.