

NOTE 1: OPEN BOOK, OPEN NOTES, CLOSED NEIGHBOURS.
NOTE 2: SHOW ALL WORK IN ORDER TO RECEIVE FULL CREDIT.
NOTE 3: START EACH PROBLEM ON A NEW PAGE.

1. 25 pts.

A sequential network has one input (X) and two outputs (Z_1 and Z_2). An output $Z_1 = 1$ occurs every time the input sequence 101 is completed provided that the sequence 011 has never occurred. An output $Z_2 = 1$ occurs every time the input 011 is completed. Note that once a $Z_2 = 1$ output has occurred $Z_1 = 1$ can never occur, but *not* vice versa. Find a Mealy state graph and state table (minimum number of states is 8).

2. 50 pts.

A sequential circuit has one input and one output. The Mealy state diagram is shown in Fig. P2. Using the state assignment shown below, design the circuit with j-k Flip-Flops and draw the circuit diagram using 2-input NAND Gates.

A	000
B	001
C	010
D	011
E	100
F	101
G	110

b) Does your circuit count out of the don't care states? Justify your answer.

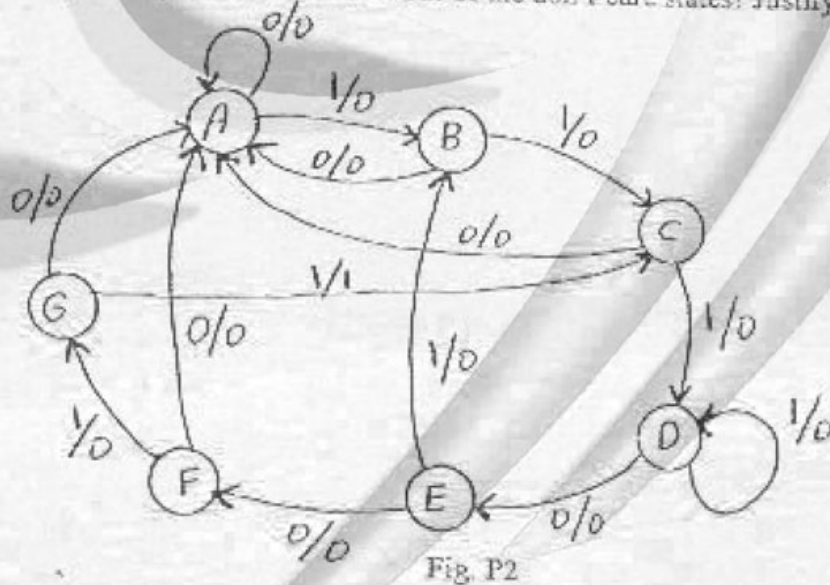


Fig. P2

3. 25 pts. Reduce the following state table to a minimum number of states.

Present State	Next State		Present Output	
	X=0	1	X=0	1
a	h/l	c/e	1	0
b	c	d	0	1
c	h	b	0	0
d	f	h	0	0
e	c	f	0	1
f	f	g	0	0
g	g	c	1	0
h	a	e	1	0