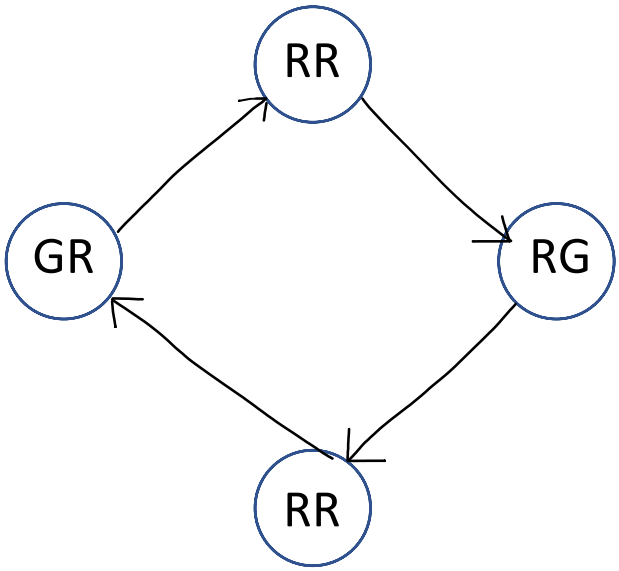
Part 2: (a) State Diagram for the System

(Draw a state diagram as in page 5)



A Four-State Design

Notation: L1L2, so GR = Light 1 is Green and Light 2 is Red

Part 2: (b) Define the State Table

(Complete a state table as in page 6)

Present State		Next State	
Number	Alias	Number	Alias
0	GR	1	RR
1	RR	2	RG
2	RG	3	RR
3	RR	0	GR

Part 2: (c) Derive the Output Equations.

(Derive output equations (for the lights) as in page 10)

	Alias	Q_1 Q_0	G1	R1	G2	R2
0	GR	0 0	1	0	0	1
1	RR	0 1	0	1	0	1
2	RG	1 0	0	1	1	0
3	RR	1 1	0	1	0	1

Output equations

$G1 = Q_1' \bullet Q_0'$ $\quad\quad$ $G2 = Q_1 \bullet Q_0'$

$R1 = G1'$ $\quad\quad$ $R2 = G2'$

Part 2: (d) Derived the State Transition Table.

(Complete a state transition table as in page 12)

Present State		**Next State**
	Q_1 Q_0	Q_1 Q_0
0	0 0	0 1
1	0 1	1 0
2	1 0	1 1
3	1 1	0 0

Part 2: (e) Derive the Input Equations

(Derive the input equations (J-K inputs) as in page 16)

Separating the Table into Two Tables

Q_1			Q_0		
PS		NS	PS		NS
Q_1	Q_0	Q_1	Q_1	Q_0	Q_0
0	0	0	0	0	1
0	1	1	0	1	0
1	0	1	1	0	1
1	1	0	1	1	0

Deriving the Input Tables

Flip-Flop 1				Flip-Flop 0			
PS		NS	Input	PS		NS	Input	
Q_1	Q_0	Q_1	J_1 K_1	Q_1	Q_0	Q_0	J_0	K_0
0	0	0	0 d	0	0	1	1	d
0	1	1	1 d	0	1	0	d	1
1	0	1	d 0	1	0	1	1	d
1	1	0	0 d	1	1	0	d	1

Karnaugh Maps for deriving the Input Equations

(1) Karnaugh Map: J_1

Q_1 \ Q_0	**0**	**1**
0	**0**	**1**
1	**d**	**d**

$$J_1 = Q_0$$

(2) Karnaugh Map: K_1

Q_1 \ Q_0	0	1
0	d	d
1	0	1

$$K_1 = Q_0$$

(3) Karnaugh Map: J_0

Q_1 \ Q_0	0	1
0	1	d
1	1	d

$$J_0 = 1$$

(4) Karnaugh Map: K_0

Q_1 \ Q_0	0	1
0	d	1
1	d	1

$$K_0 = 1$$

The Input Equations Are:

$J_1 = Q_0$ $\qquad$ $J_0 = 1$

$K_1 = Q_0$ $\qquad$ $K_0 = 1$

Part 2: (f) Draw the Circuit

(Draw the circuit without the D-flipflops as in page 17)