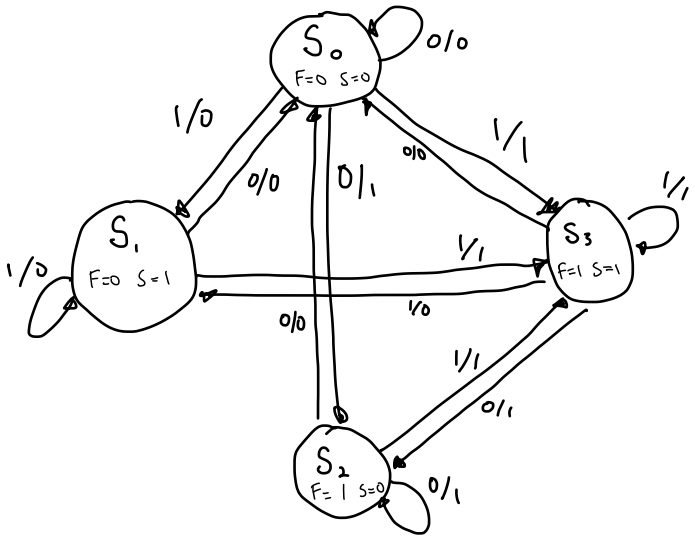
Pre-Lab Worksheet #6 NAME: Derek Wurno

LAB Section: B010

1 a) Draw the state diagram for a FSM to represent the given specifications.



1 b) Write an encoded state table (transition table) corresponding to the state diagram above.

Present State		Next State F+ S+			
F	**S**	**DT = 00**	**DT = 01**	**DT = 10**	**DT = 11**
0	0	$S_0 \rightarrow 00$ (F+ S+)	$S_2 \rightarrow 10$ (F+ S+)	S_1 01 (F+ S+)	S_3 11 (F+ S+)
0	1	$S_0 \rightarrow 00$	NA → /	S_1 01	S_3 11
1	0	$S_0 \rightarrow 00$	$S_2 \rightarrow 10$	NA /	S_3 11
1	1	$S_0 \rightarrow 00$	$S_2 \rightarrow 10$	S_1 01	S_3 11

1 c) Fill in the Karnaugh maps for F+ and S+ and write minimal sum-of-products equations for F+, S+ (show your work).

FS\DT

FS \ DT	00	01	11	10
00	0	1	1	0
01	0	X	1	0
11	0	1	1	0
10	0	1	1	X

F+

T

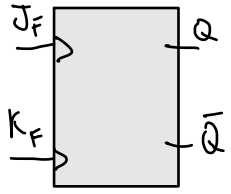
FS\DT

FS \ DT	00	01	11	10
00	0	0	1	1
01	0	X	1	1
11	0	0	1	1
10	0	0	1	X

S+

D

1 d) Create the Karnaugh maps for J_F and K_F , J_S *and* K_S write minimal sum-of-products equations for each



FS\DT

	00	01	11	10
00	0	1	1	0
01	0	X	1	0
11	X	X	X	X
10	X	X	X	X

J_F

FS\DT

	00	01	11	10
00	X	X	X	X
01	X	X	X	X
11	1	0	0	1
10	1	0	0	X

K_F

J	K	Q	$\bar{Q}$	State
0	0	Q	$\bar{Q}$	no change
0	1	0	1	reset
1	0	1	0	Q=1
1	1	–	–	toggle

$J_F =$ T

$K_F =$ T

FS\DT

	00	01	11	10
00	0	0	1	1
01	X	X	X	X
11	X	X	X	X
10	0	0	1	X

J_S

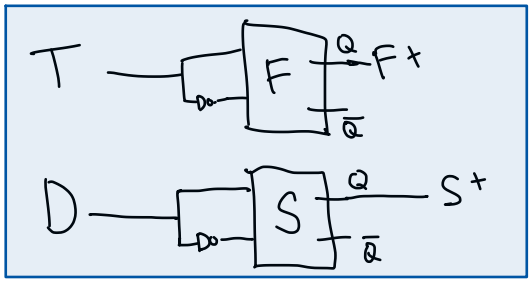
FS\DT

	00	01	11	10
00	X	X	X	X
01	1	X	0	0
11	1	1	0	0
10	X	X	X	X

K_S

$J_S =$ D

$K_S =$ $\bar{D}$



2 a) Complete a state table corresponding to the state diagram.

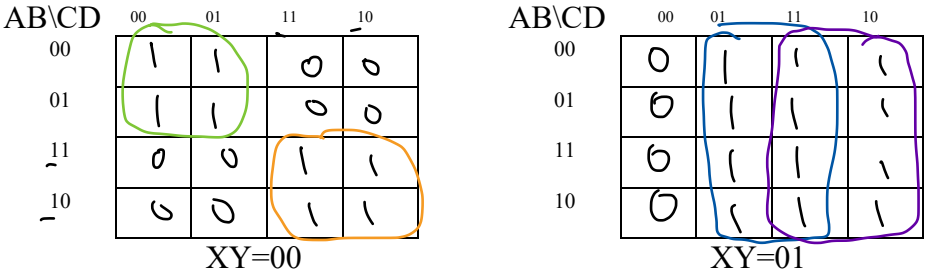
present state	condition				next state
	A	B	C	D	
S_1	1	x	x	x	S_2
S_1	x	1	x	x	S_2
S_1	0	0	x	x	S_1
S_2	x	0	0	x	S_3
S_2	X	1	1	X	S_2
S_2	X	0	1	X	S_4

S_2	x	1	0	x	S_4
S_3	0	x	1	x	S_3
S_3	0	x	0	x	S_2
S_3	1	x	1	x	S_2
S_1	1	x	0	x	S_4
S_4	x	x	0	0	S_3
S_4	x	x	1	x	S_1
S_4	x	x	x	1	S_1

2 b) Complete the encoded state table (transition table).

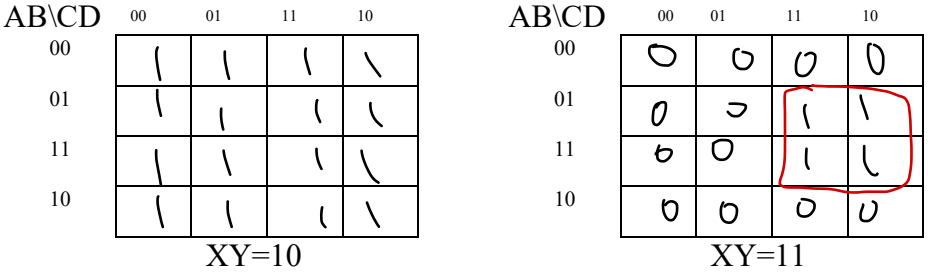
present state	condition				next state
XY	A	B	C	D	X^+Y^+
10	1	x	x	x	1 1
10	x	1	x	x	1 1
10	0	0	x	x	1 0
11	x	0	0	x	0 0
11	x	1	1	x	11
11	x	0	1	x	01
11	x	1	0	x	01
00	0	x	1	x	00
00	0	x	0	x	11
00	1	x	1	x	11
00	1	x	0	x	01
01	x	x	0	0	00
01	x	x	1	x	10
01	x	x	x	1	10

2 c) Fill in the Karnaugh maps for the next states X^+, Y^+.



D + C

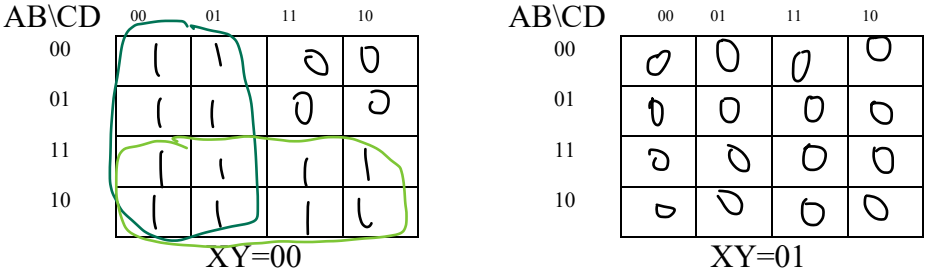
Maps for X+



1 (xȳ)

BC

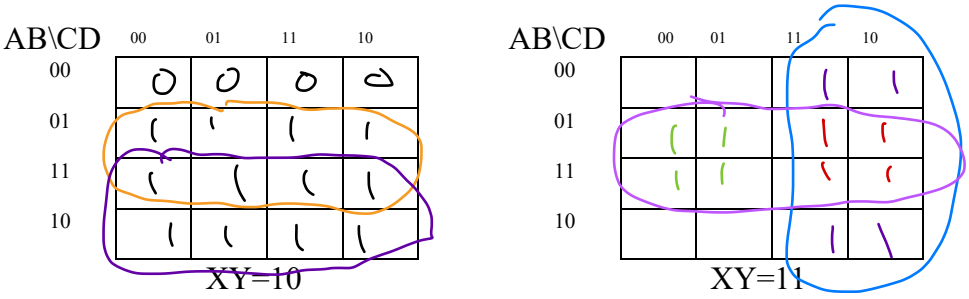
$A\bar{C} + AC + D + C + BC$



$\bar{C} + A$

0

Maps for Y+

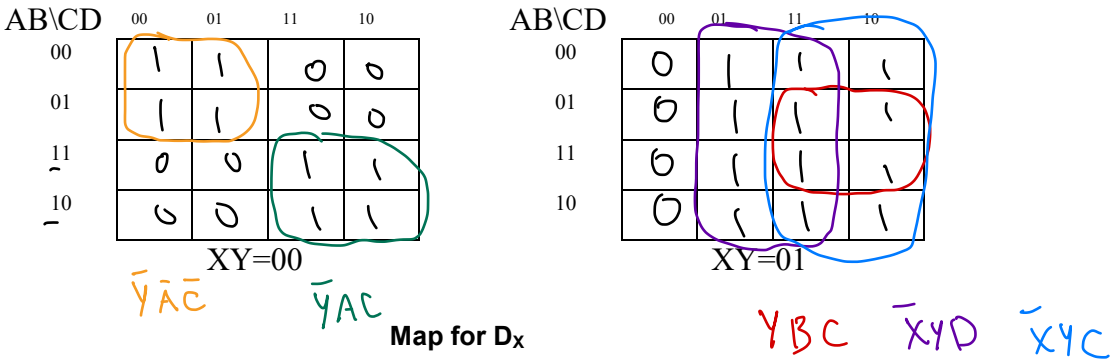


B + A

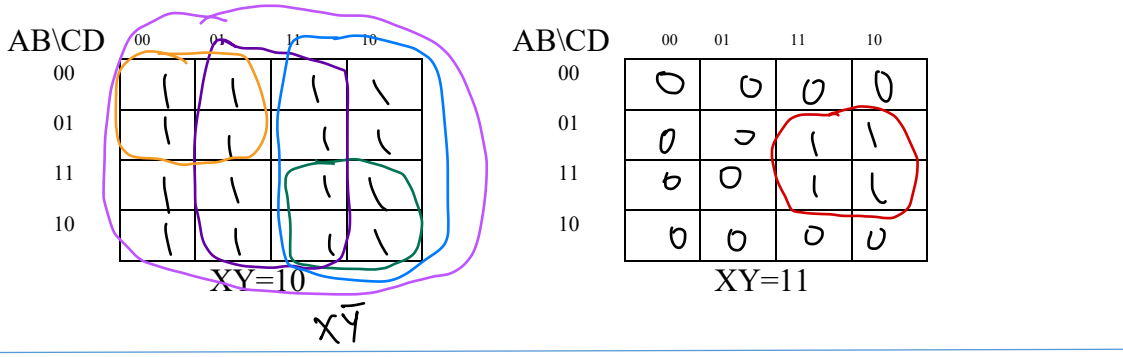
B + C

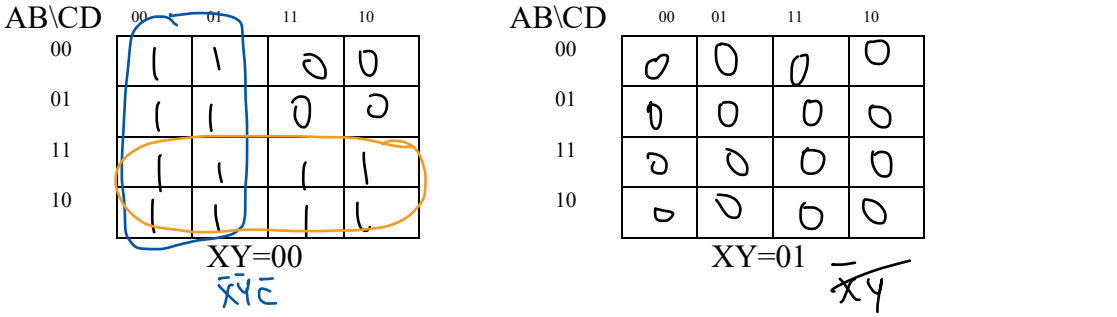
$\bar{C} + A + B + C$

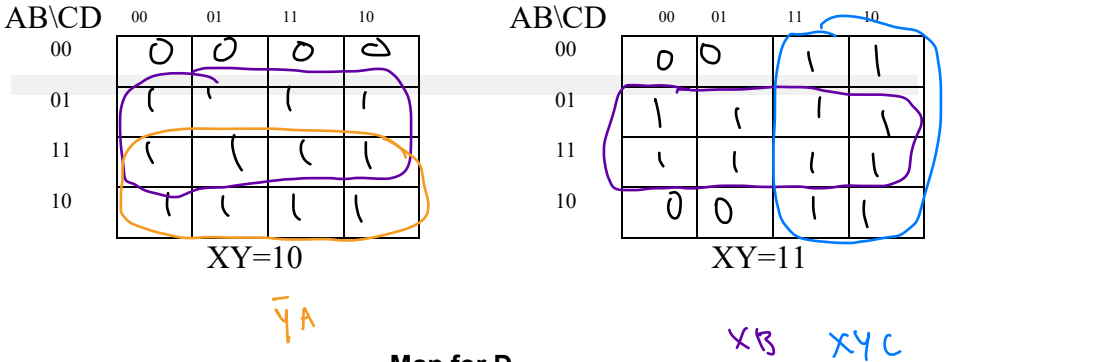
2 d) Fill in the maps for each of D_X and D_Y.



Map for D_X







Map for D_Y

2 e) Determine the minimal sum-of-products equations for each of D_X and D_Y.

$D_X = X\bar{Y} + YBC + \bar{X}Yd + \bar{X}YC + \bar{Y}\bar{A}\bar{C} + \bar{Y}AC$

$D_Y = \bar{X}\bar{Y}\bar{C} + \bar{Y}A + XB + XYC$

2 f) Draw the circuit