Homework 5:

5.5:

	00	01	11	10
1	3,0	1,–	–	–
2	6,–	2,0	1,–	–
3	–,1	–	4,0	–
4	1,0	–	–	5,1
5	–	5,–	2,1	1,1
6	–	2,1	6,–	4,1

5.5.1 – compatible pairs using pair chart.

→ non-compatibles – X
compatibles – ✓
conditional – S_1, S_2

2	6,3				
3	x	x			
4	x	6,1	x		
5	✓	1,2	x	1,5	
6	1,2	x	4,6	4,5	x
	1	2	3	4	5

5.5.2 Maximal Compatibles.

→ check for subset of larger compatibles.

$$\Rightarrow (\bar{1}+\bar{3})(\bar{1}+\bar{4})(\bar{2}+\bar{3})(\bar{2}+\bar{6})(\bar{3}+\bar{4})(\bar{3}+\bar{5})(\bar{5}+\bar{6})$$

$$\Rightarrow \bar{3}\bar{4}\bar{6} + \bar{2}\bar{3}\bar{4}\bar{5} + \bar{1}\bar{3}\bar{6} + \bar{1}\bar{2}\bar{4}\bar{5} + \bar{1}\bar{2}\bar{3}\bar{5}$$

Maximal compatible set = {125, 16, 245, 36, 46}.

5.5.3 prime compatibles.

→ Implied compatibles must be selected for closure.

→ only prime compatibles gives optimum solution.

$\Rightarrow \{125, 36, 2, 16, 15, 24, 25, 2, 245, 3, 4, 45, 6, 46\}$.

$\Rightarrow \{125, 15, 16, 2, 24, 25, 245, 3, 36, 4, 45, 46, 6\}$.

5.5.4

Setting up the binate covering problem.

	125	15	16	2	24	25	245	3	36	4	45	46
1	1	1	1	-	-	-	-	-	-	-	-	-
2	1	-	-	1	1	1	1	-	-	-	-	-
3	-	-	-	-	-	-	-	1	1	-	-	-
4	-	-	-	-	-	-	-	-	-	1	1	1
5	1	1	-	-	-	1	1	-	-	-	1	-
6	-	-	1	-	-	-	-	-	1	-	-	1
7	0	-	-	-	-	-	-	-	1	-	-	-
8	1	-	0	-	-	-	-	-	-	-	-	-
9	-	-	-	1	0	-	-	-	-	-	-	-
10	1	-	-	-	-	0	-	-	-	-	-	-
11	1	-	-	-	-	-	0	-	-	-	-	-
12	1	1	-	-	-	-	0	-	-	-	-	-
13	-	-	1	-	-	-	0	-	-	-	-	-
14	-	-	-	-	-	-	-	-	0	-	-	1
15	1	1	-	-	-	-	-	-	-	-	0	-
16	-	-	-	-	-	-	-	-	-	-	1	0

5.5.5:- Giving it to BCP ~~algorithm~~ code solver gives $= \{x_1, x_9, x_{11}, x_{12}\}$

$= \{125, 36, 45, 46\}$.

5.5.5:-

Reduced table from solution

= { 125, 36, 45, 46 }

		00	01	11	10
x_1	125	x_2, 0	x_1, 0	x_1, 1	x_1, 1
x_2	36	-, 1	x_1, 1	x_4, 0	x_4, 1
x_3	45	x_1, 0	x_1, -	x_1, 1	x_1, 1.
x_4	46	x_1, 0	x_1, 1	x_4, -	x_3, 1

5.7.1:

State allignment without using outputs

=> pairwise intersection should be empty.

	00	01	11	10
1	1,0	2,0	3,0	1,0
2	4,0	2,0	2,0	2,1
3	4,1	2,0	3,0	3,0
4	4,0	5,0	3,0	4,0
5	1,1	5,0	5,1	5,0

partition list without using outputs.
→ look for pairwise partition on same states.

$P_1 = \{15, 24\}$
$P_2 = \{15, 34\}$
$P_3 = \{45, 12\}$
$P_4 = \{23, 45\}$
$P_5 = \{13, 2\}$
$P_6 = \{2, 34\}$
→ no more subsets with partitions.

Boolean matrix building.

	1	2	3	4	5
P_1	0	1	–	1	0
P_2	0	–	1	1	0
P_3	1	1	–	0	0
P_4	–	0	0	1	1
P_5	0	1	0	–	–
P_6	–	0	1	1	–

Pairwise intersections:- compatible states.

P_2	✓					
P_3	X	X				
P_4	X	X	✓			
P_5	✓	X	X	X		
P_6	X	✓	✓	X	X	
$\bar{P}_5$	X	X	X	X	X	✓
	P_1	P_2	P_3	P_4	P_5	P_6

Maximal intersectibles:-

$m_1 = \{P_1, P_2\}$
$m_2 = \{P_1, P_5\}$
$m_3 = \{P_2, P_6\}$
$m_4 = \{P_3, P_4\}$
$m_5 = \{P_3, P_6\}$
$m_6 = \{P_5, P_6\}$.

Covering problem setup.

m_1	m_2	m_3	m_4	m_5	m_6	
1	1	–	–	–	–	1
1	–	1	–	–	–	2
–	–	–	1	1	–	3
–	–	–	1	–	–	4
–	1	–	–	–	1	5
–	–	1	–	1	1	6

Solution from BCP algorithm. $= \{m_1, m_4, m_6\}$.

$= \{m_1, m_4, m_6\}$

Reduced table

	1	2	3	4	5
m_1	0	1	–	1	0
m_4	1	0	0	1	1
m_6	1	0	1	1	1

State allignment:-

	00	01	11	10
1	1,0	4,0	5,0	1,0
4	7,0	4,0	4,0	4,1
5	7,1	4,0	5,0	5,0
7	7,0	2,0	5,0	7,0
2	1,1	2,0	2,1	2,0.