Haowen Xue
Mg257
HW4-1

	Binary Address	Index	Hit/Miss	Replacement?
0	0000	0	Miss	No
4	0100	0	Hit	No
16	0001 0000	0	Hit	No
132	1000 0100	4	Miss	No
232	1110 1000	7	Miss	No
160	1010 0000	5	Miss	No
1024	0100 0000 0000	0	Miss	Yes
30	0001 1110	0	Miss	Yes
140	1000 1100	4	Hit	No
3100	1100 0001 1100	0	Miss	Yes
180	1011 0100	5	Hit	No
2180	1000 1000 0100	4	Miss	Yes

1) 5.3.4
   Therefore, there are total number of 4 blocks needed for replacement.

2) 5.3.5
   The hit ratio would be 4/12 = 33.3333%.

3) 5.3.6
   index tag data
   <4, 2, mem[2018]>
   <5, 0, mem[180]>
   <0, 3, mem[3100]>
   <7, 0, mem[232]>

2-5.7.1

There are total 4 blocks since total size of 24 words with two-words blocks and it a 3-way set.

address	binary rep.	tag	index	hit/miss	block 0	block 1	block 2	block 3
3	11	0	1	miss		(0,1)		
180	10110100	22	2	miss			(22,2)	
43	101011	5	1	miss		(5,1),(0,1)		
2	10	0	1	hit		(5,1),(0,1)		
191	10111111	23	3	miss				(23,3)
88	1011000	11	0	miss	(11,0)			
190	10111110	23	3	hit				(23,3)
14	1110	1	3	miss				(23,3),(1,3)
181	10110101	22	2	hit				
44	101100	5	2	miss				
186	10111010	23	1	miss	(5,1),(0,1), (23,1)			
253	11111101	31	2	miss		(22,2), (5,2),(31,2)		

2-5.7.2

There are total 8 blocks since total size of 8 words with one-word blocks and it's a fully associative cache.

address	binary rep.	tag	hit/miss	blocks 0	blocks 1	blocks 2	blocks 3	blocks 4	blocks 5	blocks 6	blocks 7
3	11	3	miss	3							
180	10110100	180	miss	3	180						
43	101011	43	miss	3	180	43					
2	10	2	miss	3	180	43	2				
191	10111111	191	miss	3	180	43	2	191			
88	1011000	88	miss	3	180	43	2	191	88		
190	10111110	190	miss	3	180	43	2	191	88	190	
14	1110	14	miss	3	180	43	2	191	88	190	14
181	10110101	181	miss	181	180	43	2	191	88	190	14
44	101100	44	miss	181	44	43	2	191	88	190	14
186	10111010	186	miss	181	44	186	2	191	88	190	14
253	11111101	253	miss	181	44	186	253	191	88	190	14