DS5110/CS5501 Caching Policy Worksheet

Problem 1 FIFO, size 2:

1, 2 (full), 3, take out 1, put in 1 (full) — recent

Data. Hit?

1		miss, starting with an empty state
2		miss
1		hit, because it's there
3		miss,d
1		miss

Hit ratio: 1/5 = 0.2

Problem 2 LRU, size 2:

A, B (full) — recent

Data. Hit?

A		miss
B		miss
A		hit
C		miss
A		hit

Hit ratio: 2/5 = 0.4

Problem 3 LRU, size 3:

W, X, Y, evict W and add Z — recent

Data. Hit?

W		miss (compulsory miss)
W		hit
X		miss (compulsory)
Y		miss (compulsory)
Y		hit
Z		miss
Y		hit
X		

Hit ratio: 4/8 = 0.5

Miss latency: 20 ms

Hit latency: 0.1 ms

Average latency: 0.5*20 + 0.5*0.1 =

Problem 4 LRU, size 4:

3, 4, 5, 6 (full), take out 3 and add 7, take out 4 and add 3, take out 5 and add 4, take out 6 and add 5, take out 7 and add 6, take out 3 and add 7...	recent

Data. Hit?

3	☐	miss (compulsory)
4	☐	miss (compulsory)
5	☐	miss (compulsory)
6	☐	miss (compulsory)
7	☐	miss
3	☐	miss
4	☐	miss
5	☐	miss
6	☐	miss
7	☐	miss

Hit ratio: 0

Belady's Anomaly: when the working set (ex: {3, 4, 5, 6, 7}) is one more than the size (ex: 4) OR some similar instance (like timing, etc)

Problem 5 LRU, size 5:

3, 4, 5, 6, 7 (full), move 3, move 4, move 5, move 6, move 7	recent

Data. Hit?

3	☐	
4	☐	
5	☐	
6	☐	
7	☐	miss (compulsory)
3	☐	hit
4	☐	hit
5	☐	hit
6	☐	hit
7	☐	hit

Hit ratio: 0.5