CSS 422

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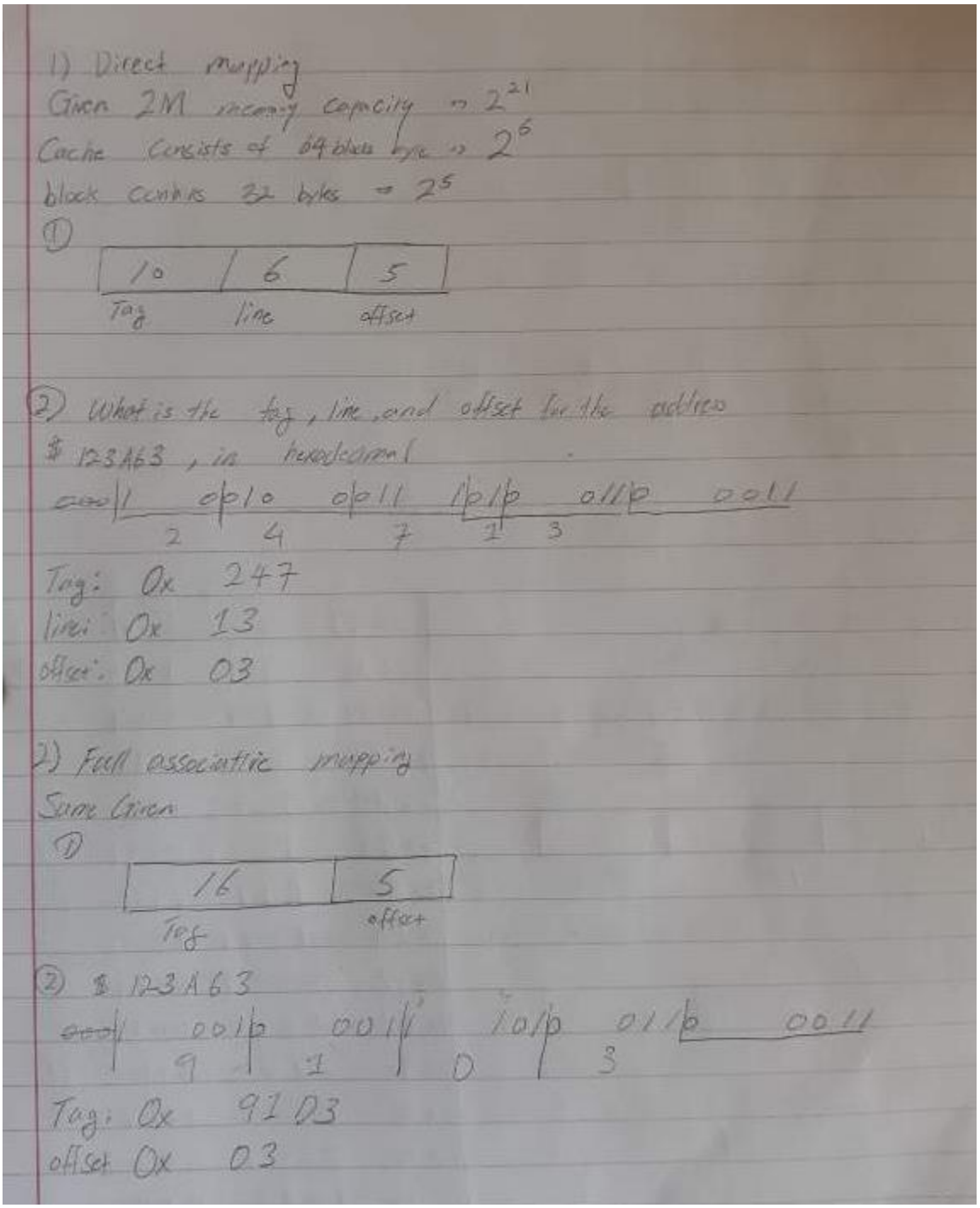
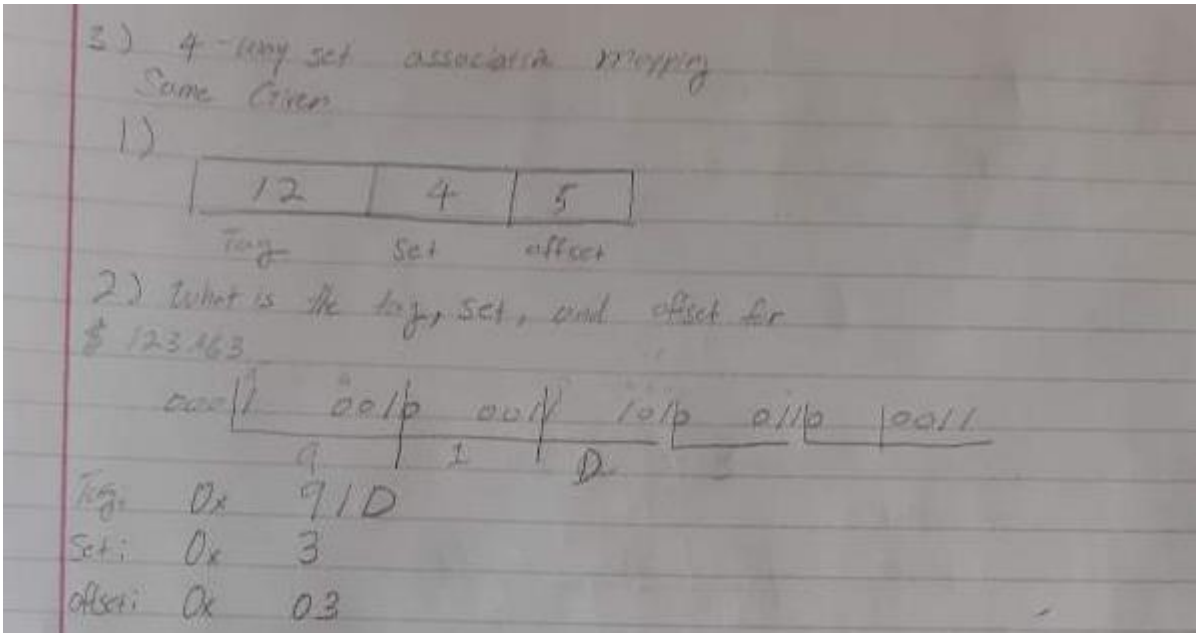
Homework 4

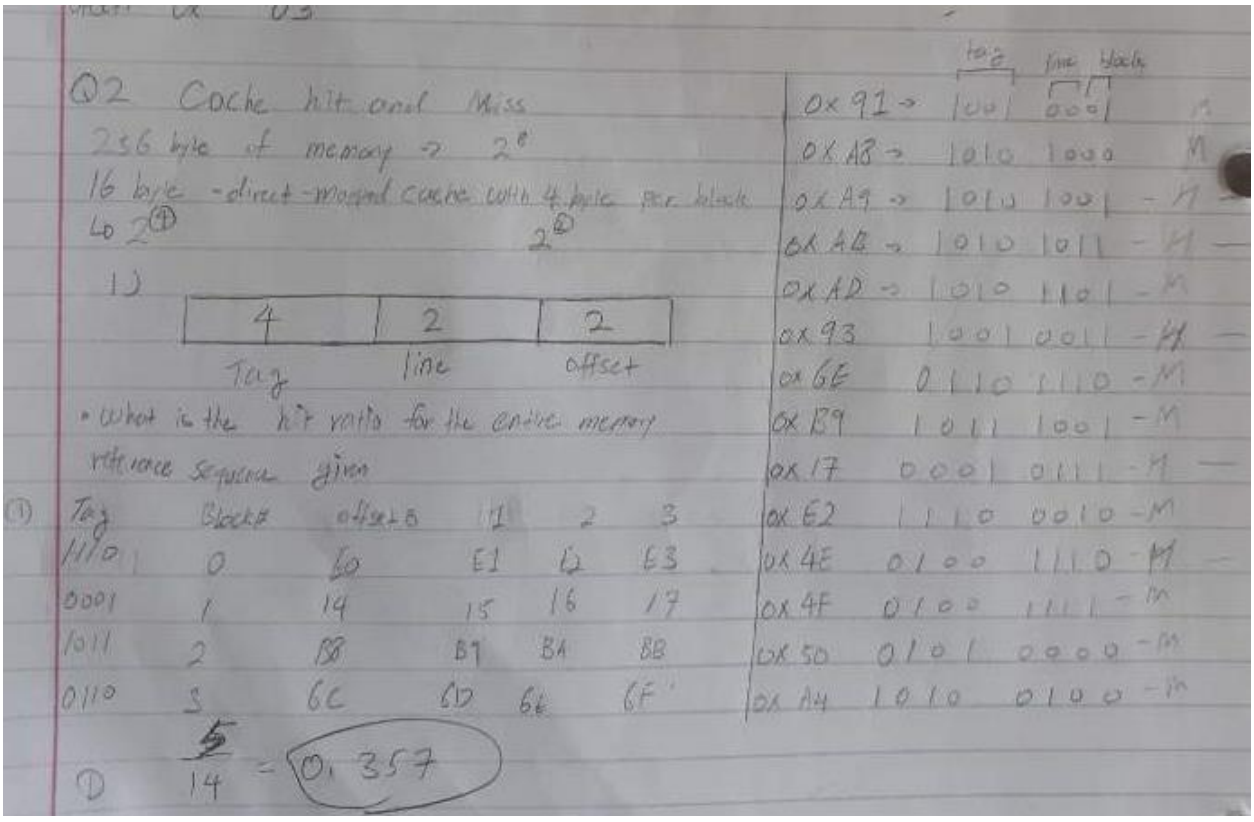
Q1. (10pts) Cache and Memory mapping



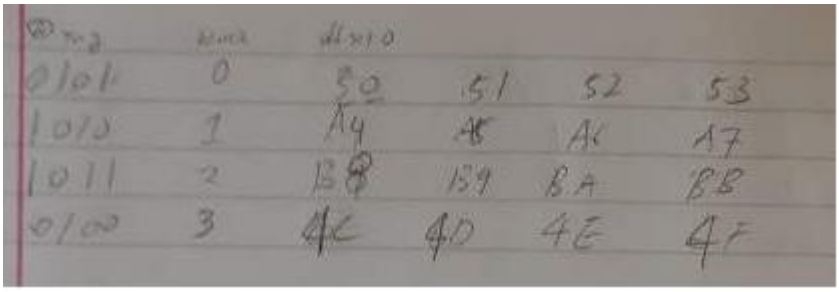


Q2. (10 pts) Cache hit and miss

1, What is the hit ratio for the entire memory reference sequence given (in bold)?



2. What memory blocks will be in the cache after the last address has been assessed?



Q3. (10 pts) Virtual memory and cache

Q3 Virtual Memory and Cache

Given

- 256 k byte virtual address space
- 128 k byte physical address
- Each Frame 32 k byte

1) Virtual 2^{18}, Physical 2^{17}, Each frame 2^{15}

Virtual

3	15

Physical

2	15

2. Split the bits in memory address based on the cache

Physical 2^{17}, 2k byte direct mapped cache, block has 256 byte

2^{17} $2^{11-8=(3)}$ 2^{8}

6	3	8
	Line	offset

3) Suppose the processor has requested to access a memory in 0x 32764

1) Show the change of TLB, TLB LRU, Page table and Mem LRU Also State whether page fault happen or not

State of work 0x 32764

00/1 00/10 0111 0110 0100

6

1) Search TLB → not exist

2) Search page table → not exist → Page fault

3) So Find victim page (Mem LRU)

Update MEM LRU Stack as ...

6
0
5
4

4) Update Page table (Has to be ordered)

Virtual Page#	Physical Page#	valid
0	2	1
1	—	0
2	—	0
3	—	0
4	0	1
5	3	1
6	1	1
7	—	0

⑤ Update TLB

Virtual page #	Physical page #	Valid
6	1	1
0	2	1

⑥ Update TLB LRU stack

6
0

Final Answer for

1)

TLB	Virtual page	Physical page	Valid
	6	1	1
	0	2	1

TLB LRU Stack

6
0

Page table

Virtual page #	Physical page #	Valid
0	2	1
1	—	0
2	—	0
3	—	0
4	0	1
5	3	1
6	1	1
7	—	0

Mem LRU stack

6
0
5
4

Page fault

2) Show the changes in Cache.