Problem 1: Page Table Size

The page size is increased by 4x, but the total sizes of physical and virtual memory are unchanged. PTE's are originally 20 bits.
(a) does the number of virtual pages increase or decrease? By how much?
(b) by what factor does the number of PTE's (rows in PT) increase or decrease?
(c) does the number of physical pages increase or decrease? By how much?
(d) how many more (or fewer) bits are needed to store a physical page number?
(e) by what factor does the size of PTE's (columns in PT) increase or decrease?
(f) by what factor does the size of the page table increase or decrease?

Problem 2: Two-level PT Translations

(a) 0x123
(b) 0xCBA
(c) 0x777

Problem 3: AMAT

Mem-access time is 10ns, disk-acess time is 10ms, what is AMAT when hit rate is
(a) 50%
(b) 98%
(c) 99%
(d) 100%

Problem 4: Optimal

(a)

Access	Hit	State (after)
1		
2		
3		
4		
1		
2		
3		
4		
3		
2		
1		

(b) what is hit rate?
(c) what is hit rate modulo compulsory misses?

Problem 5: FIFO

Access	Hit	State (after)
1		
2		
3		
4		
1		
2		
3		
4		
3		
2		
1		

Problem 6: Mind-Blowing FIFO

Access	Hit	State (after)
1		
2		
3		
4		
1		
2		
5		
1		
2		
3		
4		
5		

(a) cache size 3
(b) cache size 4

Problem 7: LRU vs. MRU

How many hits will there be?
(a) size-3 LRU, workload = 1,2,3,4,3,4,3,4
(b) size-3 MRU, workload = 1,2,3,4,3,4,3,4
(c) size-3 LRU, workload = 1,2,3,4,1,2,3,4
(d) size-3 MRU, workload = 1,2,3,4,1,2,3,4