CS286 Computer Architecture & Organization
Fall 2026
Exercise Question for November 9, 2026

QUESTION #1

How large the VMT will be for 16GB virtual memory with a page size is 4KB. 64MB is installed for the physical memory.

QUESTION #2

Assume a computer memory system that uses a combination of segmentation and virtual memory. Also assume that the page size is 1KB (= 1024 bytes). For each of the following three addresses the CPU generates, find the physical address. If the specified address is not in the memory, clearly mention what the memory access request will cause. Each memory access request issued by the CPU consists of six decimal digits, of which the first two digits represent the segment number. On a page fault, the page will be loaded in the physical page in the virtual memory table. Show all your work.

Use the two tables attached at the end of this exam (in APPENDIX section). Assume "1" = TRUE and "0" = FALSE.

Example: "033010" $\rightarrow$ The offset address is 3,010 bytes from the beginning of the third segment (segment 03, which is segment #3).

(1) 049154

(2) 022040

(3) 062112

QUESTION #3

In each page fault, if a memory page needs to be replaced for loading a new page to the physical memory, is it any improvement we can add to improve the access latency?

APPENDIX:

The following is the

Segment ID	BASE	LIMIT
0	0	8192
1	8192	7168
2	15360	5120
3	20480	3072
4	23552	8192
5	31744	7168
6	38912	3072
7	41984	•••
8	•••	•••
9	•••	•••
•••	•••	•••

Logical Page	Valid	Dirty	Physical Page
0	1	0	7
1	1	1	12
2	0	0	3
3	0	0	2
4	0	0	3
5	0	0	8
6	1	0	10
7	0	0	11
8	1	0	14
9	0	0	5
10	0	0	14
11	1	0	15
12	1	1	16
13	0	0	1
14	1	0	0
15	0	0	0
16	0	0	10
17	0	0	11
18	1	1	13
19	1	1	5
20	0	0	4
21	0	0	6
22	0	0	7
23	0	0	9
24	0	0	8
25	0	0	10
26	1	0	2
27	1	1	3
28	0	0	2
29	1	1	8
30	1	0	4
31	0	0	14
32	0	0	13
33	0	0	1
34	1	0	11
35	0	0	5
36	1	0	9
37	0	0	3
38	0	1	9
39	0	0	8
40	1	0	6
41	1	0	1
42	0	0	0
43	0	0	15
•••	•••	•••	•••