The agenda for CS286 lecture #19 (October 31, 2022):

1. Pick up:
   - Attendance card

2. Quiz #7 is scheduled today (only for section 001) – using the 15 minutes at the end of the lecture

3. Quiz #8 is scheduled this Wednesday (11/2)
   - Quiz #8 question list has been posted to the course home

4. Introduce “memory segmentation” and “segmentation fault” (then cover the following Quiz #8 questions)
   #13: Sketch the structure of “segmentation table (or “segmentation descriptor table”).
   #14: What is the advantage of using segmentation?
   #15: How is “segmentation fault” caused?
   #16: Which of “page fault” or “segmentation fault” is fatal?

5. Cover EXERCISE #3 on October 26th:

**QUESTION #3**

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” → 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
6. Discuss the following Quiz #8 questions:

   #1: What is “memory paging”?
   #2: What is “virtual memory”?
   #3: How does “virtual memory (using memory paging)” eliminate “external (memory) fragmentation” (explain “how”)?
   #4: What is “internal (memory) fragmentation”?
   #5: What is “page fault” (CS314 needs this concept)?
   #6: What is “valid flag” used in virtual memory for?
   #7: Sketch the contents in VMT (virtual memory table).
   #8: What is the primary problem in virtual memory?
   #10: What is “demand paging”? What is the primary advantage?
   #11: What are the primary advantages in using “virtual memory (using demand paging)”?
       Mention at least three different advantages in using “virtual memory”.

7. Introduce “dirty flag” (PPT slides), then the following questions will be discussed

   #9: How is “dirty flag” used in virtual memory for (explain its primary purpose)?
   #12: In the virtual memory (as we discussed in the classroom), how many disk accesses can happen in the worst case?