Computer Operating Systems

Problem#1

Define the Mutual Exclusion Problem. Explain why it is important for OS design and give examples where in OS implementation mutual exclusion might be needed. Define semaphores. Describe two semaphore operations. Given the two operations provide pseudocode solution to the mutual exclusion problem.

Problem #2

Describe page-based random access memory management. Define and differentiate a page and a frame. Define page table. Describe multi-level page tables. Explain why multi-level page tables are necessary. Describe and explain the need for either inverted page tables or hashed page tables (choose only one).

Problem#3

Define the concepts of a block, sector, track, cylinder and platter with respect to disk space allocation. Define the concept of a free linked (block) list. Explain how the linked list is used for disk space allocation. Explain what bit vector-based disk space allocation is. Explain the advantages of this method over free-list based.