Computer Operating Systems

**Problem #1**

Explain the basic method of paging. Include descriptions of:

a. Its advantages over earlier methods of memory management
b. necessary hardware support,
c. basic page table implementation, (You do not need to discuss hierarchical or multilevel paging, hashed or inverted page tables),
d. the role of a translation lookaside buffer (TLB),
e. valid/invalid bits
f. what pages can be shared and how shared pages are implemented.

**Problem #2**

a. What is the Optimal Page Replacement Strategy? Explain how Least Recently Used (LRU) approximates this and what is its difficulties or disadvantages. Can you suggest how a LRU type algorithm could be implemented in a system which has a modified bit but not a referenced bit?
b. Illustrate Optimal and LRU assuming 3 pages may be held in memory and references are to page numbers:

7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1

State any assumptions you make and comment on the results?

**Problem #3**

Explain briefly the following seek algorithms:

FCFS, SSTF, SCAN, C-SCAN.

Give a sequence of track requests for each algorithm which could result in indefinite postponement, if such exists.

If 2 or more requests come sequentially for the same track, how should each algorithm handle them. Justify your answer.