3. (a) Explain, using appropriate pseudo-code, how the bounded waiting property of the critical section problem can be guaranteed. [5]

(b) Using a two-process system, develop an example to illustrate the nature of the problem that arises if the test and set primitive to ensure mutual exclusion is not executed atomically. [5]

(c) Explain when a page fault occurs in a virtual memory system and how such a fault is handled. [5]

(d) You are given the following reference string for referenced page numbers:

7, 1, 0, 2, 3, 4, 0, 1, 3, 2, 0, 2, 7, 4, 0, 1, 5, 4, 0, 3

Assume that a process can have up to 4 pages in memory at any time and that memory is initially empty. By clearly showing your working, calculate the hit ratio when the following page replacement policies are used:

(i) First In First Out (FIFO). [5]

(ii) Least Recently Used (LRU). [5]