1. Consider a byte-addressable (addresses are memory byte addresses) memory- management system using ***paging*** and a logical address consists of 16-bit page number and 10-bit offset.

a) What is the frame size in this system?
b) What is the maximum number of entries in a page table?
c) What is the maximum size of the logical address space?
d) How many frames are needed to store the largest page table if the size of a page table entry is 4 bytes?

2. Consider a segmentation system with the following segment table.

Segment number	Base	Limit
0	660	248
1	1752	422
2	222	198
3	996	604

For each of the following logical addresses, determine the physical address or indicate if the address is invalid (out of bound).

a) 0,198
b) 2,156
c) 1,530

3. Consider the following page table for a process currently executing in a paging system. All numbers are decimal. Assume that the virtual addresses have 20 bits and the page size is 1 KB.

10bits

Page number	Present bit	Modified bit	Frame number
0	1	0	4
1	1	1	7
2	0	0	-
3	1	0	0
4	0	0	-
5	1	1	2

Convert the following decimal relative addresses, which are defined with reference to the origin of the program, to the corresponding binary virtual addresses. What is the 16-bit physical address which results from dynamic address translation, or would a page fault occur?

a) 5499
b) 2221

4. Consider the following page address stream formed by executing a process :

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

Assuming that three frames are allocated to this process and the frames are initially empty, show what pages are in memory at each reference and find the number of page faults for the following replacement algorithms. **Before the frame allocation is initially filled, all first unique pages are also counted as page faults.**

a) OPT
b) FIFO
c) LRU
d) Clock

Self-test

1. In a system employing a paging scheme for memory management, wasted space is due to _____.
   A. external fragmentation
   B. internal fragmentation
   C. pages and frames of different specified sizes
   D. none of the above

2. In a system employing a segmentation scheme for memory management, a process is divided into _____ .
   A. one segment per thread
   B. a number of threads
   C. a number of segments which need not be of equal size
   D. a number of segments which must be of equal size

3. A _____ is issued if a desired page is not in main memory.
   A. paging error
   B. page replacement policy
   C. page fault
   D. page placement policy

4. The _____ determines when a page should be brought into main memory.
   A. page fault
   B. fetch policy
   C. page placement policy
   D. page replacement policy

5. The _____ policy results in the fewest number of page faults.
   A. optimal
   B. FIFO
   C. Clock
   D. LRU

6. The situation where the processor spends most of its time swapping process pieces rather than executing instructions is called _____.
   A. paging
   B. principle of locality
   C. thrashing
   D. None of the above