Questions:

Q1)

Consider a system with 640KB of main memory. The following blocks are to be requested and released:

block	A	B	C	D	E	F
size (KB)	200	200	150	80	80	240

Obviously, not all blocks may be accommodated at the same time. We say an allocation failure occurs when there is no hole large enough to satisfy a given request. Devise a sequence of requests and releases that results in an allocation failure under:

(a) the first fit policy, but not the best fit policy

(b) the best fit policy, but not the first fit policy

For each of the two situations, draw a diagram that shows what parts of memory are allocated at the time of failure. (Hint: there is no systematic approach to this problem; you simply need to experiment with different sequences.)

Q2)

Consider a system with 4.2 MB of main memory using variable partitions. At some point in time, the memory will be occupied by three blocks of code/data as follows:

starting address	length
1,000,000	1 MB
2,900,000	.5 MB
3,400,000	.8 MB

The system uses the best-fit algorithm. Whenever a request fails, memory is compacted using one of the following schemes:

(a) All blocks are shifted toward address zero (see Figure 7.9(b))

(b) Starting with the lowest-address block, blocks are shifted to ward address zero until a hole big enough for the current request is created (see Figure 7.9(c))

Assume that three new blocks with the respective sizes 0.5 MB, 1.2 MB, and 0.2 MB are to be loaded (in the given sequence).

(a) Show the memory contents after all three requests have been satisfied under the two different memory compaction schemes.

(b) How many bytes of memory had to be copied in each case?

Q3)

In a system with paging and segmentation, each virtual address (s, p, w) requires 3 memory accesses. To speed up the address translation, a translation look-aside buffer holds the components (s, p) together with the corresponding frame number. If each memory access takes m ns and the access to the translation look-aside buffer takes $m/10$ ns, determine the hit ratio necessary to reduce the average access time to memory by 50%.

Q4)

Assuming a physical memory of four page frames, give the number of page faults for the reference string *abgadeabadegde* for each of the following policies. (Initially, all frames are empty.)

(a) MIN

(b) FIFO

(c) Second Chance algorithm

(d) Third Chance algorithm (assume that all accesses to page b are write requests)

(e) LRU

(f) VMIN with $\tau = 2$

(g) WS with $\tau = 2$