

Prepare your answers to the following questions either in a plain text file or in a Microsoft Word file. Answer each question clearly and concisely, but completely, using complete sentences. Explanatory tables and/or diagrams are acceptable, but there must always be a written discussion as well.

Submit your file to the Curator system by the posted deadline for this assignment. No late submissions will be accepted.

For questions 1 – 5, assume a process has 4 frames allocated to it, and that the following table shows the relevant facts about the resident pages of the process:

Virtual page #	Page frame #	Time loaded	Time referenced	Referenced bit	Modified bit
2	0	60	161	0	1
1	1	130	160	1	0
0	2	26	162	1	0
3	3	20	163	1	1

The process makes a reference to page 4 at time 164. Which page frame will have its contents replaced, for each of the following replacement strategies?

- [15 points] Belady's Optimal Algorithm (if necessary, use the reference string given in question 5)
- [15 points] the FIFO Algorithm
- [15 points] the LRU Algorithm
- [15 points] the Clock Algorithm (as described on page 357 of Stallings)
- [15 points] Assume the same initial state shown in the table above. The process makes the following sequence of page references:

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

Suppose the working set policy with LRU (see Stallings 364-367) is used, with a window size of 4 instead of a fixed frame allocation. How many page faults would occur?

- [13 points] What is the purpose of the *translation lookaside buffer*? Be brief but precise.
- [12 points] What is the difference between a *resident set* and a *working set*? Be brief but precise.