CSE4300 Operating Systems Homework 4 (Due Dec. 10th)

Question 1.1 (25 points) Demand paging uses a second chance page replacement policy. It uses one reference bit to give every page one more chance in FIFO replacement. Assume that the system has 3 page frames. Consider the following page reference stream: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3. Please fill in the following table for the second-chance algorithm. Please also give the number of incurred page faults.

Request sequence		7	0	1	2	0	3	0	4	2	3
Second-chance	Frame 1										
	Frame 2										
	Frame 3										

Question 1.2 (10 points) Explain why in the enhanced second-chance algorithm, replacing one page might need to search circular queue several times.

Question 2 (15 points) What is the cause of thrashing? How does the system detect thrashing? Once it detects thrashing, what can the system do to eliminate this problem?

Question 3 (20 points): Please describe the key principles of the following directory organization methods: single-level directory, two-level directory, tree-structured directory, acyclic graph directory, and general graph directory. Please discuss them advantages and disadvantages.

Question 4 (30 points): Consider a file currently consisting of 100 blocks. Assume that the file control block (and the index block, in the case of indexed allocation) is already in memory. Calculate how many disk I/O operations are required for contiguous, linked, and indexed (single-level) allocation strategies, if, for one block, the following conditions hold. In the contiguous-allocation case, assume that there is no room to grow at the beginning but there is room to grow at the end. Also assume that the block information to be added is stored in memory.

a. The block is added at the beginning.
b. The block is added in the middle.
c. The block is added at the end.
d. The block is removed from the beginning.
e. The block is removed from the middle.
f. The block is removed from the end.