DQE--Fall 2007--Operating Systems 1

1. (10 points)
Define the following terms and describe the use of these concepts in parameterizing a virtual memory system for efficiency.

a. working set

b. locality

c. thrashing

2. (20 points)
Suppose your system has 3 page frames. You need to process the following set of page references, given that the page frames are all initially empty. For each of the given algorithms, fill in the table to show the page frame contents at each step. Circle each page in the table which has caused a page fault and give the total number of faults

5 3 4 3 1 2 1 4 3 4 5 3 2

a. for LRU: total # faults:

Frame0													
Frame1													
Frame2													

b. for FIFO: total # faults:

Frame0													
Frame1													
Frame2													

c. for the optimal page replacement algorithm, OPT: total # faults:

Frame0													
Frame1													
Frame2													

3. (20 points)

Explain why strict LRU paging is not usually implemented and describe how LRU can be modified to make it more practical.

Doctoral Qualifying Examination

Written Questions in
Operating Systems

Sep. 2007

(2) (50 points)
Consider an operating system where process control can be selected by the user to be one of three methods: 1) no preemption, 2) preemption, but no time-slice, and 3) preemption with time-slice of 2 ms. Assume an I/O call is made by each process every 1 ms and I/O calls require 2 ms to complete. Also assume there are sufficient number of devices to assure no I/O conflict. Determine and compare the turn-around and throughput for this job stream for each process control method. Make and explain any reasonable assumptions you may need to complete the problem.

Job	Arrival (ms)	CPU Time Reqd (ms)	Priority (1 highest)
1	0	4	1
2	1	3	2
3	2	2	3
4	2	3	2
5	3	4	1