CS 4760	**Operating Systems**	Test 3
Name:	Fall 2004	Max Pts: 64

Important: This is an open book test. You can use any books, notes, or paper. *Do not log into the computer, or use any communications device during the test.* Any calculations and rough work can be done on the back side of the test pages. You must show all your work. You will lose five points for not writing your name.

1. [10 pt] In a virtual memory system, 1 in 400 references (on average) causes a page fault. When the page fault is to be serviced, 1 in 5 pages have their dirty bit set. Let the average seek time for the disk be 10 milliseconds. The disk rotates at 7200 rpm. The average wait time in device queue is 2 milliseconds. Each block is 1K and there are 256 blocks per track. Let the memory access time be 100 nanoseconds when there is no page fault. Compute the average memory access time in this system.

2. [5 pt] Explain the phenomenon known as "DLL-hell". What is the reason for this phenomenon?

3. [8 pt] How can working set strategy prevent thrashing? Can we achieve the same effect with page fault frequency technique? How?

4. [5 pt] Device drivers are part of the kernel. However, we know that both Solaris and Linux support plug-and-play for new devices. How is this implemented in those systems?

5. [18 pt] If FIFO page replacement is used with 5 page frames, how many page faults will occur with the reference string

   5 2 3 7 2 9 3 1 4 2 8 1 0 1 3 7 0 9 0

   if the frames are initially empty. Now repeat this problem for OPT, LRU, LFU, and second chance algorithm. How will it perform with a window size of 5 under the working-set algorithm (assume unlimited number of frames available for working set algorithm but working set window size is 5)?

6. [18 pt] Consider a disk with 256 cylinders, indexed from 0 to 255, with 0 being the innermost and 255 being the outermost cylinder. The system receives disk requests on the following tracks in the specified order

94 47 90 226 38 81 198 67 124 74 96

The head is currently on cylinder 65, and is moving towards outer cylinder. If the head requires 0.1ms to move from one track to the next, give the time required to service the given requests using each of the following algorithms.

(a) FCFS scheduling

(b) SSTF scheduling

(c) SCAN scheduling

(d) C-SCAN scheduling, servicing requests as head moves outwards

(e) LOOK scheduling

(f) C-LOOK scheduling, servicing requests as head moves outwards