CS 4760	**Operating Systems**	Test 3
Name:	Winter 2006	Max Pts: 58

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. [6 pt] What is *hit ratio* in memory management? Should our goal be to maximize it or to minimize it?

2. [6 pt] I just received a disk of size 300GB that is to be connected to my computer. This machine tracks free space on the disk using a bit-vector approach. Each block on the disk is of size 4KB. What is the size of my bit-vector in bytes? How many blocks on disk must be reserved for the bit vector?

3. [12 pt] If FIFO page replacement is used with 5 page frames, how many page faults will occur with the reference string

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

if the frames are initially empty. Now repeat this problem for OPT and LRU algorithms. 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)?

4. [6 pt] I just bought a disk that runs at 7200 RPM. There are 64 sectors per track. The disk has 512 cylinders and the head moves from one track to next in 0.05ms. What is its average latency?

5. [10pt] A machine has a memory of 256 frames, with each frame being 1K bytes. Current free-frame list is: 0x1C, 0x41, 0x16, 0x07, 0x02, 0x08, 0x13, 0x50, 0x1D, 0x4E, 0x3F, and 0x4C. You just scheduled a process that requires 8 frames. Show the resulting page table. Show the translation of logical address 0x1C39 and 0x080B into physical addresses using your page table.

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

   63 176 52 194 84 85 47 46 82 30 27

   The head is currently on cylinder 82, and is moving towards outer cylinder. The head requires a total of 16ms to move from innermost to outermost track. 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