CS 4760	**Operating Systems**	Test 3
Name:	Fall 2005	Max Pts: 68

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 the difference between internal and external fragmentation?

2. [6 pt] I just received a disk of size 40GB 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 512bytes. What is the size of my bit-vector in bytes? How many blocks on disk must be reserved for the bit vector?

3. [18 pt] If FIFO page replacement is used with 5 page frames, how many page faults will occur with the reference string

1 8 4 9 4 2 1 5 9 1 6 3 2 1 3 4 5 1 6

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)?

4. [4 pt] What is the file system used on iPod when connected to a Windows machine?

5. [6 pt] I just bought a disk that runs at 7200 RPM. There are 64 sectors per track. The disk has 1024 cylinders and the head moves from one track to next in 0.1ms. What is its average latency?

6. [10pt] A machine has a memory of 256 frames, with each frame being 1K bytes. Current free-frame list is: 0x19, 0xC2, 0x75, 0xE8, 0x2F, 0x0C, 0x96, 0xDF, 0xE0, 0xD1, 0xC4, and 0x0A. You just scheduled a process that requires 10 frames. Show the resulting page table. Show the translation of logical address 0x33D7 and 0x2BAA into physical addresses using your page table.

7. [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

   10 165 192 122 61 78 93 8 35 80 15

   The head is currently on cylinder 77, 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