CS 4760	**Operating Systems**	Test 3
Name:	Spring 2013	Max Pts: 58

Important: This is an open book test. You can use any books, notes, or paper but no electronic device. *Do not log into the computer during the test, or use any electronic or communications device. Switch off your cell phones*. Any device with an ON-OFF switch should have its switch in the OFF position. Any calculations and rough work can be done on the back side of the test pages. If there is a syntax error in any program segment, just write it down and you will get full credit for the problem. You will lose five points for not writing your name.

1. [6 pt] Why is the capability to relocate processes desirable?

2. [8 pt] Why is the average search time to find a record in a file less for an indexed sequential file than for a sequential file? Under what circumstances will the search in sequential file be quicker compared to the indexed sequential file?

3. [10 pt] Consider a system that has 8MB memory available. The memory requests are satisfied by allocating frames of size 4096 bytes. The requests for allocation and deallocation come from different processes in the following order:

```
P0: m00 = malloc ( 18K );
P3: m30 = malloc ( 16K );
P1: m10 = malloc ( 14K );
P3: free ( m30 );
P3: m31 = malloc ( 28K );
P8: m80 = malloc ( 23K );
P6: m60 = malloc ( 18K );
P2: m20 = malloc ( 8K );
P1: m11 = malloc ( 27K );
P1: free ( m10 );
```

Use the buddy algorithm to show the memory layout after each request.

4. [6 pt] What is the difference between block-oriented devices and stream-oriented devies? Give two examples of each.

5. [10 pt] Consider a machine with the memory access time for RAM to be 90ns. You are running processes that, on an average, have 1 page fault in 25,000 memory accesses. Out of these page faults, 1 in 2 pages turn up with their dirty bit set. The disk has a seek time of 14ms and is spinning at 14,400 rpm. Consider about 1ms for transfer time for data. At any time, there are, on an average, two processes in the device queue. Compute the effective memory access time for this system.

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

   91, 138, 250, 131, 173, 209, 175, 129, 35, 200

   The head is currently on cylinder 13, and is moving towards outer cylinder. Give the total number of tracks traversed for 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