CS 376	**Operating Systems**	Test 3
Name:	Winter 1999	Max Pts: 41

Important: This is an open book test. You can use any books, notes, or paper. *Do not log into the computer during the test.* Any calculations and rough work can be done on the back side of the test pages.

1. [5 pt] Suppose a system has a disk with 2KB disk blocks and the average access time on a block is 20 milliseconds. A process holding 40 KB of memory transitions from running to blocked due to a resource request. How long must the process remain blocked to justify swapping out the process. This scenario is on a system that allows swapping an entire process but not a part of the process as would be the case with paging or segmentation.

2. [6 pt] Consider a system with file allocation using the techniques discussed for BSD Unix. That is, the system has 12 direct blocks, one single indirect block, one double indirect block, and one triple indirect block. The block size is 512 bytes. We have got a disk partition that can hold 25 GB formatted (after accounting for boot block, superblock, and inode table). What is the maximum file size that can be supported on such a system? Do not forget to maximize the number of pointers that you can fit on each block. Does the disk size somehow affect the maximum file size?

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

$$4\ 9\ 3\ 5\ 8\ 2\ 3\ 5\ 7\ 8\ 2\ 4\ 1\ 4\ 3\ 7\ 6\ 3\ 5\ 2\ 3$$

if the frames are initially empty. Now repeat this problem for LRU and second chance algorithm. How will it perform with a window size of 6 under the working-set algorithm?

4. [18 pt] Disk requests come in to the disk driver for cylinders 171, 196, 115, 19, 167, 177, 166, 60, 55, 83 and 87 in that order. A seek takes 6 msec per cylinder moved. The arm is currently at cylinder 153. The cylinders are numbered from 0 to 199. How much seek time is needed for

   (a) FCFS scheduling

   (b) SSTF scheduling

   (c) Elevator algorithm (initially moving away from cylinder 0)

   (d) C-SCAN scheduling (initially moving away from cylinder 0) satisfying requests as the head moves away from cylinder 0

   (e) LOOK scheduling (initially moving towards cylinder 0)

   (f) C-LOOK scheduling (initially moving towards cylinder 0) satisfying requests as the head moves away from cylinder 0