CS 4760	**Operating Systems**	Test 3
Name:	Fall 2019	Max Pts: 64

Important: This is an open book test. You can use any books, notes, or paper. *Do not use any electronic or communications device. Change your cell phones to silent mode*. 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. Please write legibly; if I cannot read what you wrote, I'll give you a zero. The test is 75 minutes long. You will lose five points for not writing your name.

1. [6 pt] Discuss the pros and cons of worst-fit algorithm compared to first-fit and best-fit for dynamic memory management. What is the average complexity of search for worst-fit?

2. [6 pt] Can we perform relocation at execution-time with load-time binding? Explain your answer.

3. [6 pt] We enable paging in x86 architecture by setting the `PG` flag of control register `cr0`. Under what circumstances on an average Linux machine do we clear `PG` so that linear addresses are interpreted as physical addresses?

4. [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 4 pages turn up with their dirty bit set. The disk has a seek time of 10ms 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.

5. [6 pt] Linux does not recognized a file type by extension. Yet, if you attempt to `cat` a binary file to a screen, the utility warns you that you are trying to display a binary file. How does `cat` achive that in the absence of a file type information in file name?

6. [6 pt] Why does Linux require a file's hard link to be on the same partition as the file?

7. [6 pt] Generally, the index sequential files require index to be stored in a separate file. Can I store index within the same file as where data resides? How can I achieve that?

8. [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

180, 74, 155, 69, 110, 253, 104, 41

The head is currently on cylinder 103, and is moving towards inner cylinder (cylinder 0). 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