MC78 Midterm Exam

Serial #:

This exam is an open-book, open-notes, individual-work exam. Please write your name only on this page. Do not turn the page until instructed, in order that everyone may have the same time. Then, be sure to look at all problems before deciding which one to do first. Some problems are easier than others, so plan your time accordingly. You have 50 minutes to work.

Write the answer to each problem on the page on which that problem appears. You may use the back of that same sheet if you need additional space. You may also request additional paper.

Name: ______________________________

Problem	Page	Possible	Score
1	2	12	
2	3	12	
3	4	12	
Total		36	

1. [**12 Points**]

   The administrator of a computer system observes the following facts. During the day, the system has many interactive users. They work closely with the computer, but normally don't do anything very computationally demanding. Instead, those who have large computations to do set their programs up to run only after everyone has gone home at night. (The system allows processes to be specially marked for running only at night.) At night, there are typically several of these computationally intensive programs running, but very few if any interactive users.

   Assume that the system's scheduler doesn't have any way to distinguish between interactive programs and computationally intensive ones. However, the administrator can set the operating system up in such a way that the system will automatically change a numerical parameter of the scheduler in the morning, and change it back again in the evening.

   What parameter would make sense to change twice a day in this way, so that the daytime and nighttime workloads are both handled well? In which time period should the value be larger? Explain.

2. [**12 Points**]

Two transactions, T_1 and T_2, operate concurrently in a system using two-phase locking. Each transaction makes use of two shared variables, a and b. The ordering of events (omitting the lock acquisitions and releases) is as follows:

T_1	T_2
read a	
	write a
write b	
	read b

There are eight events missing from the above table:

(a) T_1's acquisition of a lock on a.

(b) T_1's acquisition of a lock on b.

(c) T_1's release of a lock on a.

(d) T_1's release of a lock on b.

(e) T_2's acquisition of a lock on a.

(f) T_2's acquisition of a lock on b.

(g) T_2's release of a lock on a.

(h) T_2's release of a lock on b.

These eight events need to fall somewhere in the following five time periods:

(a) Before T_1 reads a.

(b) After T_1 reads a, but before T_2 writes a.

(c) After T_2 write a, but before T_1 writes b.

(d) After T_1 writes b, but before T_2 reads b.

(e) After T_2 reads b.

For each of the eight events, indicate which of the five time periods might legally contain that event. (It is possible that some events may have more than one legal time period.) You can indicate your answers simply by writing the letters of the time periods next to the descriptions of the events.

3. [**12 Points**]

   Explain two respects in which LFS and XFS are similar to each other, while being different from more classic Unix file systems. Also, explain one way in which LFS and XFS differ from each other.