

1. (5%) What problems could occur if a system allowed a file system to be mounted simultaneously at more than one location?
2. (5%) Why are segmentation and paging sometimes combined into one scheme?
3. (10%) In the consumer-producer example program, a ring buffer queue is used to store the produced item that will be taken off by the consumer later. In what conditions the program need not to use the lock synchronization primitive to support the correct processing?
4. (10%) Define the difference between preemptive and nonpreemptive scheduling. Explain why strict nonpreemptive scheduling is unlikely to be used in a computer center.
5. (10%) Consider the following code segment:

```
pid_t pid;
pid = fork();
if (pid == 0) { /* child process */
fork();
thread_create( . . . );
}
fork();
thread_create( . . . );
```

 - a. How many unique processes are created?
 - b. How many unique threads are created?
6. (10%) Can a multithreaded solution using multiple user-level threads achieve better performance on a multiprocessor system than on a single processor system? Explain.
7. (15 %) What is the difference between deadlock prevention and deadlock avoidance?
8. (10%) Suppose a thread is running in a critical section of code. It means that the thread has acquired all the locks through proper arbitration. Can this thread get context switched? Please explain the reasons.
9. (25%) Suppose that the following processes arrive for execution at the times indicated. Each process will run the listed amount of time. You may make some reasonable assumptions and write them down explicitly, if they are necessary to answer the following questions.
 - (a) Please draw Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: FCFS, non-preemptive SJF, and preemptive SJF.
 - (b) Which of the algorithms in (a) results in the minimum average turnaround time (over all processes)? Be sure to justify your answer.

- (c) Which of the algorithms in (a) results in the minimum average waiting time (over all processes)? Be sure to justify your answer.

Process	Arrival Time	Burst Time
P1	0	10
P2	5	3
P3	3	5
P4	4	4