V1

June 24, 1997

cs450 - Operating Systems
Summer 1997

Midterm Exam
closed books, closed notes

Starts: **6:20 pm** Ends**: 7:20 pm**

Name:_______________________________________(please print)

ID:__________________________

Problem	Max points	Your mark	Comments
1	40		20 + 5*4
2	5		
3	5		
4	5		
5	10		5 + 5
	65		

1. Some operating system uses a preemptive SJF (Shortest Job First) algorithm for CPU scheduling. Processes with a lower ID number have priority in case of a tie. Several processes are submitted for execution: their arrival times and burst-intervals are summarized in the following table.

Process	Arrival	Burst Distribution
P1	0	C[a](1), D1[b](1.5), C(1), D2[c](2), C(2)
P2	0.5	C(1.5), D2(2.5), C(0.5), D2(1.5), C(1)
P3	0.5	C(0.5), D1(0.5), C(0.5), D2(0.5), C(0.5), D1(0.5), C(0.5), D2(0.5), C(0.5), D1(0.5), C(0.5)

a. C stands for the CPU and the number between parantheses for the length of the CPU burst
b. D1 stands for an I/O request on disk #1; the number between parantheses is the length of the I/O burst
c. D2 stands for an I/O request on disk #2; the number between parantheses is the length of the I/O burst

The length of the I/O burst time does not include the waiting time in the disk queue. Disk requests are processed on a FCFS basis. A new I/O request does not preempt one being processed.

a) Draw the Gantt chart illustrating the execution of these processes. Use the ruled paper attached to your exam.

b) What is the CPU utilization?

c) What is the throughput?

d) What is the average turnaround time?

e) What is the average waiting time? The waiting time is defined as the *total* time spent by a process in the waiting queue.

f) What is the average waiting time spent in disk waiting queues?

2. What is the purpose of *system calls*?

3. What is the purpose of *system programs*?

4. What does *re-entrant code* mean?

5. Assume a scheduling algorithm (at the level of short-term CPU scheduling) which favors those processes that have used little CPU time in the recent past.

a) which processes will be favored, I/O bound or CPU bound? Why?

b) is starvation possible? Explain.