CS 376	**Operating Systems**	Test 2
Name:	Winter 2000	Max Pts: 39

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. If there is a syntax error in any program segment, just write it down and you will get full credit for the problem. You will lose five points for not writing your name.

DON'T PANIC!!!

1. [5 pt] Suppose that a short-term CPU scheduler favors those processes that have used the least CPU time in the recent past. Why will this algorithm favor I/O bound processes and still not permanently starve CPU-bound processes?

2. [2 pt] What is the difference between an unsafe state and a deadlock state?

3. [5 pt] Consider a variant of the round robin scheduling algorithm where the entries in the ready queue are pointers to the PCBs. What would be the effect of putting two pointers to the same process in the ready queue? Can you name some advantages and disadvantages of this scheme?

4. [15 pt] Assume you have the following jobs to execute with one processor:

Process	Burst time	Arrival time
p_0	5	1
p_1	6	3
p_2	10	4
p_3	9	7
p_4	2	8

Give the average wait time and average turnaround time for each process using the following algorithms. Also compute the percentage of time when the system is busy with user processes.

(a) First in first out

(b) Shortest job next (decision to be made when a process is finished)

(c) Shortest remaining time next

(d) Round robin, with a quantum of 3

(e) Round robin, with a quantum of 3 plus context switch time of 1

5. [12 pt] Assume a system with four resource types, $C = \langle 5, 5, 6, 7 \rangle$ (this is the total number of resources in the system, and not what is currently available), and the maximum claim table shown below.

Process	R_0	R_1	R_2	R_3
p_0	4	3	0	2
p_1	4	3	1	4
p_2	1	4	0	2
p_3	3	5	3	2
p_4	4	5	4	4

The resource allocator is considering allocating resources according to the following table:

Process	R_0	R_1	R_2	R_3
p_0	1	3	0	0
p_1	1	0	1	3
p_2	0	1	0	1
p_3	2	1	2	0
p_4	1	4	1	1

(a) Draw a process resource graph to show the state of the system described above.

(b) Run the safety algorithm on this system to determine if this state is safe.