CS 4760	**Operating Systems**	**Test 2**
Name:	Fall 2010	Max Pts: 53

Important: This is an open book test. You can use any books, notes, or paper but no electronic device. *Do not log into the computer during the test, or use any electronic or communications device. Switch off your cell phones*. 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.

1. [6 pt] Differentiate between a mode switch and a context switch in an operating system. Why does the operating system need to perform those switches?

2. [6 pt] Give an example to distinguish between a blocked process and a deadlocked process. Which of the two conditions is a prerequisite for the other?

3. [15 pt] Assume you have the following jobs to execute with one processor:

Process	Burst time	Arrival time
p_0	2	0
p_1	3	3
p_2	8	4
p_3	7	6
p_4	3	7

Give the average wait time for this set of processes using the following algorithms.

(a) First in first out

(b) Shortest job next (non-preemptive)

(c) Shortest remaining time next (pre-emptive)

(d) Round robin, with a quantum of 3

(e) Round robin, with a quantum of 5 plus context switch time of 1

4. [10 pt] Assume a system with four resource types, $C = \langle 9, 5, 9, 6 \rangle$ (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	5	4	1	5
p_1	4	2	5	3
p_2	3	2	0	5
p_3	3	5	3	3
p_4	1	1	5	3

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

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

Run the safety algorithm on this system to determine if this state is safe. If it is safe, give the sequence in which processes can be run. If it is unsafe, enumerate the processes that may get involved in a deadlock.

5. [6 pt] What is the difference between allocating memory on stack or heap? Where does the statically allocated memory reside?

6. [10pt] A machine has a memory of 64 frames, with each frame being 1K bytes. Current free-frame list is: 0x17, 0x20, 0x07, 0x18, 0x33, 0x16, 0x03, 0x20, 0x3E, 0x04, 0x0C, 0x19, and 0x21. You just scheduled a process that requires 8 frames. Show the resulting page table. Show the translation of logical address 0x02E5 and 0x047B into physical addresses using your page table.