CS 4760	**Operating Systems**	**Test 2**
Name:	Fall 2009	Max Pts: 45

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] Enumerate the steps involved in the context switch of a process.

2. [9 pt] A system can have three types of resources: serially reusable, consumable, and shared. Give a description of each of them. Also, give an example of each of them. For each resource type, describe whether it can participate in a deadlock.

3. [6 pt] Why is a knot a sufficient condition for a deadlock? Explain using the concept of process resource graph.

4. [6 pt] Distinguish between static and dynamic linking. I have to release some library for my clients. The clients intend to use my library for further development and release their executables to their clients. Give me an argument in favor of each of static and dynamic linking for my library.

5. [8 pt] Virtual memory can be implemented using multiple base registers or a single page table base register. Give at least two arguments in favor of each of them.

6. [10 pt] Assume a system with four resource types, $C = \langle 5, 6, 4, 7 \rangle$ (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	2	3	4	4
p_1	1	5	2	7
p_2	1	5	4	5
p_3	4	4	3	2
p_4	5	4	1	2

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

Process	R_0	R_1	R_2	R_3
p_0	0	1	3	1
p_1	3	4	1	6
p_2	2	1	0	0
p_3	0	0	0	0
p_4	0	0	0	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.