CS 4760	**Operating Systems**	**Test 2**
Name:	Fall 2012	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 device with an ON-OFF switch should have its switch in the OFF position. Any calculations and rough work can be done on the back side of the test pages. You will lose five points for not writing your name.

1. [6 pt] What is the difference between preemptive and nonpreemptive scheduling?

2. [6 pt] What is the difference between deadlock avoidance, deadlock detection, and deadlock prevention?

3. [6 pt] What are the differences between logical, relative, and physical addresses?

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

Process	Burst time	Arrival time
p_0	2	0
p_1	1	2
p_2	11	3
p_3	6	5
p_4	4	6

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

5. [10 pt] Consider a system with the following set of processes and states:

$$P = \{p_0, p_1, p_2\},\ S = \{s_0, s_1, s_2, s_3\}$$

State changes due to processes are:

$$\begin{array}{lll} p_0(s_0) = s_3 & p_1(s_0) = \Omega & p_2(s_0) = \{s_1, s_2\} \\ p_0(s_1) = \Omega & p_1(s_1) = \{s_0, s_2\} & p_2(s_1) = \Omega \\ p_0(s_2) = \{s_0\} & p_1(s_2) = \{s_1\} & p_2(s_2) = \{s_0, s_1, s_3\} \\ p_0(s_3) = \{s_0\} & p_1(s_3) = \Omega & p_2(s_3) = \{s_0, s_1\} \end{array}$$

Draw the corresponding state change diagram. Is the system safe? Is it deadlocked? Is there a knot in the system?

6. [10 pt] You have a physical memory of 64MB, starting at address 0. Your operating system requires at least 10MB all the time. Consider the arrival of processes as follows:

Process	Burst time	Arrival time	Memory needed
p_0	7	0	37MB
p_1	5	1	29MB
p_2	9	4	9MB
p_3	3	7	37MB
p_4	8	10	23MB
p_5	10	11	39MB
p_6	11	13	12MB
p_7	14	14	4MB

Show the layout of memory, using best-fit algorithm, at times 10, 20, 30, 40, and 50.