

# **CS471: Operating System Concepts**

**Fall 2007**

**(Lecture: WF 9:15-10:30 AM)**

**Homework #1**

**Points: 20**

**Due: September 5, 2007**

**All questions refer to the programs in the Examples directory.**

**Question 1 [Points 5]** Modify and run **fork1.c** program so that three generations of processes are created (instead of 2 in **fork1.c**). The original process prints its pid, its child pid, and the command line argument passed to it. The child process prints its pid, its parent pid, its child pid, the original command line argument and the modified argument. The grandchild prints its pid, its parent id, the command line argument that was there when its parent called it, and the modified argument. (So if the program was called as “**modfork1.out 10**” the parent prints 10 for argument, child prints 10 and 20; and the grandchild prints 20 and 40 as the argument value.) Show the source listing and program output.

**Question 2 [Points 5]** Modify and run **thread1.c** in the following way. There is an array of 18 elements defined in the program. The elements of the array are:  
[20 18 16 14 12 10 8 6 4 2 25 23 21 19 17 15 13 11]. Thread 1 adds the first three elements (i.e., 20, 18, 16), Thread 2 adds the next three elements (i.e., 16, 14, 12), ..., Thread 6 adds the last three elements (15, 13, 11). Finally, the sum of all the 18 elements is printed by the program.

**Question 3 [Point 5]** Run **thread2.c** several times and list the output for each case.

**Question 4 [Point 5]** Run **thread3.c**, show the output, and write a brief explanation of what the program does.