CS 361 Operating Systems
Spring 20013, Dr. Beck
Midterm Exam, March 18 2013.

Answer 4 of the following 5 questions. All questions have equal weight. If more than 4 questions are answered, the first 4 will be graded.

1. **User level vs. Kernel Threads**
   Can a program implemented using user level threads obtain better performance when running on a multicore or multiprocessor computer than a single-threaded program? Other than improved performance, give one reason that multithreading is used as a software design tool.

2. **Interrupts vs. Signals**
   Explain the difference between an interrupt and a signal, in terms of how they are generated and how they are handled by the operating system. Can the occurrence of an interrupt ever result in a signal being sent? If so, explain with an example.

3. **Process Scheduling**
   Explain the mechanism that underlies preemptive process scheduling. How is a process preempted, and how is it put back in the running state? Give as much detail as you can.

4. **Interprocess Communication**
   A Unix process A needs to create two child processes B and C, and these two need to communicate with each other using a pipe. Both B and C are children of A, not of one another. Explain the actions of A, B and C using the fork, pipe, read and write system calls to accomplish this.

5. **Critical Sections**
   Name and explain completely the three elements required for a solution to the problem of maintaining a critical section within a program.