CS 377 – Operating Systems

Discussion 4 Questions

Name: _____

Write your answers individually, but feel free to consult your classmates/TA/notes/slides. Be succinct (complete sentences not necessary). **Remember to turn your paper over**.

- 1. **Threads**. Two primary types of threads were discussed in class user-level threads and kernel-level threads. Threads complement processes as basic components used to execute jobs on the CPU.
 - a. True or false: user-level and kernel-level threads are exclusive (that is, processes use one or the other). Briefly explain.

b. Suppose you have a multithreaded process that can be configured to use either kernel or user-level threads. For each of the following situations about the process, which type of threads would you prefer (and why): (i) running on a quad-core machine, (ii) executing long I/O requests, and (iii) running an extremely large number of threads. c. Why would we want to use (kernel-level) threads at all instead of just using multiple processes?

- 2. Locks. Locks are basic OS primitives used to support synchronization between threads.
 - a. What are the two essential operations of a lock and what (briefly) do they do?

b. What is are **atomic instructions** (such as Test&Set) and why are they needed to support locks (assuming we aren't disabling interrupts)?