CS 377 – Operating Systems
Discussion Session 5 Questions

Name: _____

Write your answers individually, without consulting notes, slides, books, or the internet. Be succinct (complete sentences not necessary). **Remember to turn your paper over.**

1. **Locks**. Locks are basic OS primitive 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 an **atomic instruction** (such as `Test&Set`) and why are they needed to support locks (assuming we aren't disabling interrupts)?

   (c) What is **busy waiting** and how can we reduce the amount of time spent doing it?

2. **Semaphores**. Semaphores are integers used for synchronization that are updated using the Wait and Signal operations.

   (a) How can you implement a lock using a semaphore?

   (b) How are semaphores more general/powerful than locks?

3. **Monitors**. A monitor is another synchronization construct that consists of a lock and zero or more **condition variables**. What is a condition variable?