

# Homework Two

CS176 Fall 2009

Due Thursday, 22 October

Tuesday 13 September 2009

Please answer the following exercises from the textbook.

## Exercise 34

**Exercise 42** The code in the book is flawed. Please ignore the comment line in the book's code saying that  $N$  is the total number of threads. In fact,  $N$  is the number of bits in the register. Sorry!

## 1 Programming Assignment Warmup: Locking and Counting

You will create three programs in Java that explore a simple problem: concurrently incrementing a shared counter, with and without synchronization.

### 1.1 Assignment Detail

Create three programs in Java, each with 16 threads. Have each thread increment a counter in shared memory  $2^{24}/16 = 2^{20}$  times. One program should use normal ints (with no synchronization!). The second program should use Java's `AtomicInteger` class. The last program should use any method of your choosing to lock the critical section of the first program.

To maximize contention, just before the main thread starts the counting threads, it should pick a time far in the future, say 0.25 seconds, and pass that time to the counting threads. The counting threads should spin until that time before they start counting.

Run your program on any machine in the Sunlab. We expect your report to be scientific: run multiple trials, time each method, and capture the final values of the counters (are they what you expected?).

Also hand in your programs.

**Exercise 53**

**Graduate (or Extra) Credit: Exercise 65**