

## In-Class Problems: twothreads

Suppose that there are two threads in a system that uses preemptive round-robin scheduling with a scheduling quantum of  $Q$  milliseconds. The system has a single processor. Each thread runs a function which behaves as follows

```
for i from 1 to  $N$  do
  compute for  $C$  milliseconds
  sleep for  $S$  milliseconds
end
```

At the end of its `for` loop, a thread is finished and it exits. During the “compute” part of each iteration, a thread is runnable (running or ready to run). During the “sleep” part of each of its iterations, a thread is blocked. For both parts of this question assume that  $C < Q$  and  $C < S$ .

**a.** First, assume that  $C < S$  and  $C < Q$ . Suppose that both of the threads are created at time  $t = 0$ . At what time will both of the threads be finished? Answer in terms of  $Q$ ,  $N$ ,  $C$ , and  $S$ , as necessary.

**b.** Answer the same question, but this time assume that  $S < C < Q$ .