COSC 6360   **QUIZ #2**   **JULY 26, 2010**

Closed book. You can have with you one single-sided 8½ by 11 sheet of notes.

1. In the ARC cache replacement policy, which events result in an actual change of the **size** of T1? (2×10 points) (**Hint:** This is **not the same** as an update of **target_T1.)**

    a. **T1 will increase when** _a page fault occurs and the size of T1 is lesser than target_T1._____

    b. **T1 will decrease** when a page in T1 is referenced a second time the size of T1 is greater ___

    than or equal to target_T1. _____

2. A system of physical clocks consists of two clocks, namely, one that is slow and loses two minutes every hour and another that is fast and advances by two minutes every hour. Assuming that the clocks are managed by Lamport's physical clock protocol, what will be the time marked by each clock at 3 pm given that:

    a. both clocks indicated the correct time at noon;

    b. the processors on which the clocks resides continuously exchanged messages between themselves from 1pm to 2pm ; and

    c. message transmission delays are negligible. (2×10 points)

The fast clock will indicate _____3:06 pm____ plus or minus a few seconds at 3 pm.

The slow clock will indicate _____3:02 pm____ plus or minus a few seconds at 3 pm.

3. When will the following CSP guarded comment be executed? (10 points)

```
[int flag; s < 1000; X ? flag -> s:= s +1]
```

It will be executed once if process X is running and s < 1000.

4. Which actions take place when a Treadmarks process performs:

    a. **A Tmk_lock_acquire(…)? (10 points)**

    The process waits until has acquired the requested lock and obtained the most recent

    released values of all shared variables. _____

    b. **A Tmk_lock_release(…)? (10 points)**

    It releases the specified lock and notifies Treadmarks that it has released new values of

    its shared data._____

5. What are Spin **external references**? (5 points) How does Spin represent them? (10 points) Why? (5 points) (Hint: Please answer each part of the question.)

SPIN externalized references are used to pass pointers to kernel data structures to user-level applications in a safe manner. The user-level application is given an index into a per-application table of safe references to kernel data structures. This prevents any tampering with the pointer by the user-level application.

6. What characterizes a Nooks **lightweight protection domain**? (10 points**)**

One of the many correct answers: It runs inside the kernel in privileged mode but has its own page map.