COSC 6360   SECOND MIDTERM   NOVEMBER 7, 2005

This exam is **closed book**. You can have **one sheet** (that is, **two pages**) of notes.
Please answer every part of every question

1. Assuming that you are often carrying data on your flash drive between your home computer and your computer at school, how far apart can the clocks of the two computers be if it takes you twenty minutes to go from home to school and fifteen minutes to go back home? (2×5 points)

    The clock of your home computer can run at most _ 20 _ minutes faster or at most _ 15 _ minutes slower than the clock of your computer at school.

2. What would be the major vulnerability of an hypothetical version of Kerberos *lacking authenticators*? (10 points)

    It would be vulnerable to _ replay attacks _____
    because _ Kerberos would not be able to distinguish between legitimate requests ____ _ and replays of previous requests by intruders _____

3. Which problem did Hoare solve by introducing *guarded commands* and *alternative commands* in CSP? (5 points) How are other programming languages solving—or avoiding—that problem? (5 points)

    Guarded commands and alternative commands were introduced to allow a process to do multiple blocking receives in parallel. This was needed because a CSP process doing a receive must specify the identity of the sender process. Other programming languages avoid the problem because nearly all communication packages allow processes to do a blocking receive for the first message they will receive on a specific port

4. What would be the major advantage and disadvantage of combining the Kerberos server and its Ticket Granting Service into a single entity? (2×5 points)

    The system would be _ faster _____because _ the protocol would _____ _ require three messages instead of five _____
    but also _ less secure _____ because _ the Kerberos server would me more complex and thus harder to secure _____

5. What is the function of Spring *alert bits*? (5 points)

    The alert bit is used to _ warn a thread in a shuttle of the failure of an upstream_____ _ (i.e., calling thread) _____

6. What is the main advantage of treating the thread issuing a cross-domain call and all downstream threads as a single scheduling entity? (5 points) Would it not been easier to merge these threads into a single thread? (2×5 points)

    (See paper)

7. Explain why Nooks is *slower* and *less secure* than Spin. (2×5 points)

Nooks is slower than Spin because _ it does all its checks at run time while _____
_ Spin does them at compile time _____

Nooks is less secure than Spin because _ a malicious extension could easily defeat __
_ Nooks protection mechanisms _____

8. What is the major limitation of Nooks mechanism for recovering from an extension failure? Illustrate your point with an example. (2×5 points)

Nooks recovers from an extension failure by _ killing and restarting the failing _____
_ extension _____

This solution was found to be unsatisfactory in the case of an extension _____
_ implementing an optional file system (it damaged the supported file system) _____

9. In the ARC cache replacement policy,

a) When would a block be moved from the **T1** list to the **T2** list? (5 points)

_ when it is accessed for the second time while in the cache _____

b) Which event(s)would result in an *increase* of **target_T1**? (5 points)

_ when a page in B1 is accessed _____

c) Which event(s) would result in a *decrease* of **target_T1**? (5 points)

_ when a page in B2 is accessed _____

d) Why do we say that ARC is *self-tuning*? (5 points)

_ because it adjusts itself to changes in file access patterns _____
_ (or because it has no user-settable parameter) _____