COSC 4330 SECOND MIDTERM NOVEMBER 6, 2002

This exam is **closed book**. You can have **one** page of notes. UH expels cheaters

1. For each of the statements below, indicate in one sentence whether the statement is true or false (2 points), **and why** (3 points).(5 points each).

a) A ***blocking send*** is the same as a ***buffered*** send.

False, buffered sends are non-blocking

b) The round robin scheduling policy never causes process starvation..

True, all processes have the same priority.

c) Making all remote procedures ***idempotent*** greatly simplifies the implementation of remote procedure calls.

True, we do not have to prevent of multiple executions of the same remote procedure call.

d) UNIX sockets are an example o**f** ***public mailboxes.***

False, sockets are an example of private mailboxes as they do not survive the process that requested their creation.

e) In VMS and Windows NT, the priority of a real-time process is affected by the number of I/O operations performed by that process.

False, real-time processes have fixed priorities.

f) Peterson's algorithm does not work on multiprocessor architectures.

False, it works on any architecture.

2. Two threads contain the same code

```
total_number_of_votes++;
```

incrementing the same shared variable. Assuming that no effort is made to ensure mutual exclusion between these two processes,

a) What incorrect result could happen? (5 points)

The shared variable could be incremented once when it should be incremented twice.

b) Under which circumstances would this incorrect result happen? (5 points)

When the two threads execute the increment in lockstep.

3. What is the main difference between the *at most once* and the *all or nothing* semantics in remote procedure calls? (5 points) Which one is the easiest to implement and why? (5 points)

The at-most-once semantics guarantees that remote procedure calls will never be executed more than one time but does not prevent partial executions. The all-or-nothing semantics also prevents partial execution, which makes it costlier than the at-most-once semantics.

T: ___

4. Consider the following System V Release 4 scheduler:

```
#ts_quantum  ts_tqexp  ts_slpret  ts_maxwait  ts_lwait  LEVEL
 2000        0         1          16000       1         # 0
 1000        1         2          8000        2         # 1
  XXX        2         3          4000        3         # 2
  200        3         3          2000        YYY       # 3
```

a) Circle in the list below the most meaningful value for the **XXX** parameter. (5 points)

4000 3000 2000 1000 [✓ 500] 200 100

b) Circle in the list below the most meaningful value for the **YYY** parameter. (5 points)

0 1 2 [✓ 3] 4 5

c) What is the meaning of the `ts_maxwait` parameter. (5 points)**.**

It is the maximum time that a process at a given priority level can wait in the ready queue without having its priority modified.

d) Explain how the scheduler favors I/O bound processes. (5 points)

Processes that return to the ready queue after a system call get their priorities increased.

5. Alice, Bob and Carol have decided to go to the mall: Fill the missing blanks so that Alice will always wait for Carol and Bob will always wait for Alice:

semaphore Alice_is_ready = _O_; (5 points)

semaphore Carol_is_ready = _O_; (5 points)

Alice: P(&Carol_is ready)_;

V(&Alice_is ready)_;

Bob: P(&Alice_is ready)_;

______________________;

Carol: V(&Carol_is ready)__;

______________________;

(5 points for each corrected placed P() and V())

Hint: Your solution should not allow Bob to go without Alice while she is waiting for Carol.