CS 4210

Homework #2
Assigned: June 26, 2003
Due: July 03, 2003

To be done individually (not group work). Hardcopy is due in class at start of class Thu, July 03 (or soft copy can be sent by email to me *before* start of class). As always, answer legibly, *clearly* and *succinctly*. Vague answers cannot fetch partial credit.

Question 1

We saw the following abstract data type (ADT) using path expressions for a readers-writers problem:

```
ADT  A1( R, W ) {

        Path {r}+w End;

        r( ) { }
        w( ) { }

        R( ) { r( ); }
        W( ) { w( ); }
}
```

Consider the following, which is another variant:

```
ADT  A2( R, W ) {

        Path p+q End;
        Path {o; r}+w End;

        p( ) { o( ); }
        q( ) { w( ); }
        o( ) { }
        r( ) { }
        w( ) { }

        R( ) { p( ); r( ); }
        W( ) { q( ); }
}
```

Note that only the methods R() and W() are exported for the users of ADT, while the rest are internal operations of the ADT. R() is invoked by readers, and W() is invoked by writers. Assume ties are resolved such that the "longest waiting process" is allowed to proceed.

a. What priority rules, if any, does each of the ADTs (A1 & A2) implement? Specifically, if both readers and writers are "waiting" when a writer finishes its write operation, which waiting operation(s) is/are selected to proceed next in each ADT? Justify your answers.
b. If **o**() is removed from all places in A2 (i.e., its definition and invocations are removed from the path expressions and the methods), show an "improper" sequence of operations that might get executed as a result, and explain your answer.

Hint*: This is easy if you study the Toby Blooms thesis handout.*

Question 2

In the Flash Web Server paper, the authors argue that their asymmetric process event driven (AMPED) architecture is qualitatively and quantitatively better than the multi-process (MP) architecture.

a. What, if any, is their verdict on the multi-threaded (MT) architecture? Is their argument qualitative or quantitative? *(Hint: This is easy if you study the Flash paper)*.

b. If portability weren't an issue, describe situations (hardware configurations, or offered workloads, etc.) in which you could expect a multi-threaded implementation to outperform an AMPED implementation. If none, explain why.
