

Important: This is an open book test. You can use any books, notes, or paper, but not exchange anything with other students. You are not allowed to use any electronic/communication devices, including a calculator. *Do not log into the computer during the test.* Any calculations and rough work can be done on the back side of the test pages. You will lose five points for not writing your name.

1. [6 pt] Distinguish between the extended machine and resource allocator views of an operating system. What provides the extended machine view in Unix and Windows?

2. [6 pt] Explain the difference between a thread, a primitive (as in system call), and a process.

5. [6 pt] We discussed a solution for the dining philosophers problem by using monitors. Does it satisfy our protocol for interprocess communication? Explain your answer for each condition to be satisfied in the protocol.

6. [6 pt] Look at the following code for producer consumer problem using semaphores. Does it communicate effectively? Is there a problem? Identify it. Assume that the variables have been appropriately defined.

```
void producer()
{
    while ( 1 )
    {
        item i = produce();
        mutex.P();
        empty.P();
        put ( i );
        full.V();
        mutex.V();
    }
}
```

```
void consumer()
{
    while ( 1 )
    {
        mutex.P();
        full.P();
        item i = remove();
        empty.V();
        mutex.V();
        consume ( i );
    }
}
```