Homework 3

due Tuesday, October 1, 2002, 12:01 AM

Turn in your source code for the first question (`interleaving.c`). Your answers to the other questions should be submitted as a plain text file `hw03.txt`, a postscript file `hw03.ps`, or a PDF file `hw03.pdf`.

1. Write a C program that will list all possible orderings of the machine instructions generated for the critical sections of the Producer-Consumer example from class. Recall that the statements `counter++` and `counter--` actually generate machine code such as

	Producer		Consumer
P_1	`R0 = counter;`	C_1	`R1 = counter;`
P_2	`R0 = R0 + 1;`	C_2	`R1 = R1 - 1;`
P_3	`counter = R0;`	C_3	`counter = R1;`

   Your program should list all possible interleavings of the statements P_1, P_2, P_3, C_1, C_2, and C_3. Also have your program print which interleavings produce a correct result (that `counter` has the same value it started with).

   Write your program in a file called `interleaving.c`. (8 points)

2. Consider the Bakery Algorithm from class. Explain why the following is true:

   If P_i is in its critical section, and P_k ($k \neq i$) has already chosen `number[k]` $\neq 0$, then `(number[i],i) < number[k],k)`.

   This does not need to be a formal proof, just a convincing explanation. (3 points)

3. Tanenbaum, Exercise 6, p. 153. (1 point)

4. Tanenbaum, Exercise 8, p. 153. (1 point)

5. Tanenbaum, Exercise 11, p. 154. (1 point)

6. Tanenbaum, Exercise 21, p. 154. (1 point)