CS 536 (Park) **Assignment IV** **Due: Oct. 2 (Fri.), 1998**

PROBLEM 1

(a) Finish reading Chapt. 3 of P & D.

(b) Read "Ethernet: Distributed packet switching for local computer networks" by R. Metcalf and D. Boggs. *Communications of the ACM*, 19(7):395–403, 1976. Give a 1-page summary of the paper. (For this paper, critique is optional.)

PROBLEM 2

Give a 3-page summary overview of the following aspects of UNIX system programming: signals (`sigaction`, `signal`, `kill`, `pause`) and interprocess communication (`pipe`, `mkfifo`, `semget`, `shmctl`). Organize your description around the main system calls (a subset is indicated in parenthesis). Make sure to explain the notions *atomicity*, *blocking/non-blocking*, *synchronous/asynchronous I/O*, *mutual exclusion and semaphores*, and *interrupts*, and in which system calls they play a role. The `man` pages should be the primary source of reference.

PROBLEM 3

You will find a client/server application under ~park/pub/cs536; the client program is `client.c` and the server program is `server.c`. Reverse-engineer the code and explain, in a high-level way, what the server and client are doing. Then, give a line-by-line explanation of the code—you may group several lines into one unit, as you see fit, and give a modular description. The important criterion is that your answer makes clear that you understand all aspects of the code. If you find inefficiencies, indicate what and why, and suggest possible changes. Include in your answer a clear explanation of what trick is being used to direct the output of the server back to the client and why this is nontrivial.

PROBLEM 4

(a) In the approximate analysis of Ethernet's CSMA/CD protocol shown in class, what simplifying assumptions were made to keep the analysis tractable? Do these assumptions affect the validity of the basic trade-off relation captured in the expression for *utility* ρ? If so, how? If not, why not?

(b) Consider a CSMA/CD protocol which uses *linear* backoff—i.e., at iteration i, a station or host waits for a random time (uniform) drawn from $[0, i51.2\mu s]$—instead of the exponential backoff mechanism discussed in class. Under what conditions would a linear scheme be preferable to the exponential one and in what sense? Under what conditions would the opposite be true?