csci-e215 Final Exam

May 16, 1994, USA

Your Name Here: _____

Instructions: You have two hours for this exam. This exam is 'open notes and open book'. Please write your answers on the pages in this exam booklet. No scrap paper or additional sheets will be accepted. Watch your time, be concise, think before you write, look before you leap, listen before you accept, and *always* check the return value of a system call. Good luck.

prob	points	got	section
1	5		
2	5		
3	5		
4	5		
5	5		
6	5		
7	5		
8	6		
9	6		
10	6		
11	6		
12	6		
13	6		
14	6		
a	5		
b	5		
c	5		
d	5		
e	3		

Problems 1-7: Each problem describes a particular task. For each one, state which system call(s) you would use to perform that task. In the third column, state clearly and briefly the logic of your solution.

task	system calls	method
Remove all contents of a file. That is, make it into a file of size zero bytes.		
Move a file to another directory.		
Associate an internet address to a socket.		
Reset echo mode and terminate program if user presses the interrupt key.		
Send a signal to the parent process of a program.		
Redirect standard output to a file.		
Pass an exit status to a parent process.		

Problems 8-14: Compare and contrast. Each of these problems mentions two related concepts, system calls, or operations. For each pair, explain briefly and clearly (a) what they have in common, (b) when you would use the first item, and (c) when you would use the second item.

8. `pipe()` , `socket()`

9. `open()`, `fopen()`

10. `stat()`, `ioctl()`

11. rawmode, cbreak mode

12. sleep(), wait()

13. datagram socket, stream socket

14. errno, perror()

15. Another Unix utility: **du**

The Unix utility called **du** is described in the manual as:

Name
du - print amount of disk usage

Syntax
du [-as] [name...]

Description
The du command gives the number of kilobytes contained in all files and, recursively, directories within each specified directory or file name. If name is missing, '.' is used.

Absence of either -a or -s causes an entry to be generated for each directory only.

A file that has two links to it is only counted once.

Options

-a Displays the disk usage for each file.

-s Displays a summary total only.

Bugs
Non-directories given as arguments (not under -a option) are not listed.

If there are too many distinct linked files, du counts the excess files multiply.

For this part of the exam, answer the following questions about the design and components of du. Use the space on the remaining pages.

a) What system calls will you need to use in writing **du**? What role will each play in the program? [5]

b) Write a pseudo-code (or top-level function in C) that outlines the major operation of your program. [5]

c) Do directories consume disk space? Why or why not? How does your program address this topic? [5]

d) How will you handle the requirement that multiple links are counted once? Be quite specific, and discuss how to handle errors. [5]

e) Fill in the details of the code to any degree of completeness you like. [3]