

Midterm 1–February 23
Closed book section (64 points)

The exam is to be turned in at 2:50 pm. Work the closed book section first and turn it in before you consult your books and notes to work on the open book section. For the closed book section, write your answers on the exam itself.

University regulations require that you sign the following pledge on the first page of your turned-in exam.

I have neither received nor given any unauthorized aid on this exam. _____

Problem 1. (24 points–4 points each)

Give short definitions (one or two phrases or sentences) of the following terms.

BSD

critical region

file

hashing

superuser

user mode

Problem 2. (16 points–4 points each)

Give a brief description of what the following UNIX system calls do at the user level. *You don't need to describe the implementation but be sure to mention the significance of any returned values.*

`chown(path, owner, group)`

`fork()`

`mkdir(path, mode)`

`open(path, flags, mode)` – mention a couple of possibilities for the flags

Problem 3. (4 points)

How does the use of a buffer cache reduce disk traffic?

Problem 4. (4 points)

How does a buffer read-ahead algorithm, like that of Unix, increase disk I/O performance?

Problem 5. (4 points)

Characterize the blocks you'd expect to find near the front, *i.e.*, soon to be reallocated, of the free buffer queue.

Problem 6. (4 points)

Suppose a C program starting with the following header:

```
main(argc, argv)
    int argc;
    char *argv[];
```

is compiled and the compiled code is stored in the file `yet`. If the command:

```
% yet a third time
```

is executed, what are the values of `argc` and the array elements of `argv`?

Problem 7. (4 points)

Suppose `P[0]` is a file descriptor that refers to the read end of a pipe. Under what circumstances will the system call

```
read(P[0], buff, buff_size)
```

never return?

Problem 8. (4 points)

When a new directory is created, the link count of the parent directory is increased by one. Why?