

## Quiz 9 (Dec 4, 2025)

Name:

Answer

NetID (e.g., ap191):

Please write your answers **clearly** and **keep them brief**.

Problem	Score
Question 1	/ 5
Question 2	/ 5
Total	/ 10



## Instructions

For all questions in this quiz, please assume:

- Each disk block is 4KB in size.
- For any directory (including the root directory), all of the dirents it contains occupy less than 4KB. If the question creates a new file, you should assume that they fit in the existing data block that has already been allocated to the directory.
- The command `echo` outputs its input to `STDOUT`, e.g., `echo hello world` prints `hello world`. For this quiz, assume that `echo` executes the `fflush` syscall before exiting, that is all changes are persisted on disk before it exits.

For both questions in this quiz consider a scenario where the file `/home/alice/shopping-list` contains 4KB of data. The file ends with the line `Chocolate bar`. Alice (alice) executes:

```
$ echo Comic book » /home/alice/shopping-list
```

## Questions

1. Assume that the system uses YFS, a filesystem that uses copy-on-write for crash consistency. YFS uses a single disk block to store its free bitmap, and points to this bitmap from the superblock. How many disk blocks does YFS **allocate** when executing Alice's command? [5 points]

2 (datablock and inode for the file) + 2 (data block and inode for `/home/alice`) + 2 (data block and inode for `/home`) + 2 (data block and inode for `/`) + 1 (for bitmap) = 9.

2. Assume that the system uses ext4, a file system that uses redo logging. Furthermore, ext4 is configured to only log metadata operations (that is no updates to datablocks are logged). Consider the case where Alice's computer crashes **after** the changes necessitated by the command are committed but before the changes have been applied, that is all the operation and the necessary transaction begin and end have been written to the redo log, but no inodes or data blocks have been modified. After recovery has completed:

- (i) How many data blocks are allocated to `/home/alice/shopping-list`? [2.5 points]

2 (1 containing the original 4KB, and 1 allocated newly when the command is executed).

- (ii) What is the last line of text in the file, that is what is the last line of text you would see if you opened the file in the editor of your choice? [2.5 points]

Chocolate bar, because data block changes are not logged, and thus Comic book is lost during the crash.

