Question 1: List all the files and directories that are currently in this file system.

Directories:

1. / (Inode 0)

2. /m (Inode 7)

3. /a (Inode 8)

Files:

1. /g (Inode 11)

2. /m/e (Inode 11)

3. /m/m (Inode 15)

4. /a/r (Inode 4)

5. /a/w (Inode 11)

Question 2: What error do you find in this file system? How could a check-and-repair  
program such as fsck find such errors? Could it be corrected automatically?

* The icode structure for Inode 15 is ‘r:2’, which claims reference count of 2. But in the directory, Inode 15 is only referenced once (by the entry (s,15)) in the directory data block 9. So the error in this file system is an incorrect reference count for Inode 15
* A check-and-repair program like fsck can detect these errors by scanning the Inode table and directory entries, independently tallying the number of hard links pointing to each inode. It then compares these calculated counts against the reference counts stored within each inode.
* In this case, ‘fsck’ can automatically correct this by updating the inode's stored reference count to the correctly calculated value of 1.

Question 3: What error do you find in this file system? What should a check-and-  
repair program such as fsck do when encountering such a problem?

* The error in this file sustem is that Inode 13 is marked as ‘directory’ but has no allocated data block (a:-1), which is invalid for a directory type. This is structural error
* . A check-and-repair program like fsck would detect this issue by verifying that all directories have valid data blocks. Upon finding this error, fsck would flag Inode 13 as corrupt, remove the invalid references to it from Inode 0, and either delete or mark Inode 13 as free, depending on whether it is referenced elsewhere. This process restores the consistency of the file system.

Question 4: What error do you find in this file system? Is there sufficient information  
in the file system to correct such a problem? If so, which piece of information is  
needed?

* The error is that the parent directory entry (..,3) for directory ‘/w’ (Inode 4) incorrectly points to Inode 3, which is not allocated.
* Yes, there is sufficient information to correct this problem.
* In this file system, the root directory (Inode 0) contains the entry (w,4), so identifying Inode 0 as the correct parent. Therefore, the .. entry in Inode 4 can be updated to point to Inode 0 instead of Inode 3. The piece of information needed to correct this is the correct parent inode, which can be verified by using fsck.

Question 5: What error do you find in this file system? Is there sufficient information  
in the file system to correct such a problem? If so, which piece of information is  
needed?

* The error of this file system is missing the .. (parent directory) entry in Inode 4’s data block (19). While this block also contains an unusual entry (b,0), the absence of the .. entry is the critical structural flaw, making it impossible to get to the root folder from there.
* Yes, there is sufficient information in the file system to correct this problem.
* They piece of information needed is the Inode number if the actual parent directory of Inode 4, which can be fixed usingfsck scanning other directories and identify the root directory to correct it.