Student Name: _____ Student ID # _____

UOSA Statement of Academic Integrity

On my honor I affirm that I have neither given nor received inappropriate aid in the completion of this exercise.

Signature: _____ Date: _____

Question 1: File Deletion & Atomic Operations (25 points)

A. *Describe* three actions that are taken by a UNIX OS carrying out an `unlink` system call.

1. Action One.

2. Action Two

3. Action Three

B. *Explain* a problem that could occur if `unlink` is not carried atomically.

Question 2: POSIX and C I/O (25 points)

Gilles was tasked with adding functionality to a program that used ANSI C Standard I/O for all of its I/O. Because he was more familiar with POSIX I/O, he used `fileno` to obtain the file descriptor for each open file and added POSIX I/O system calls to add the new functionality.

A. *Describe* three problems with Gilles's approach.

1. Problem One.

2. Problem Two.

3. Problem Three.

B. *Explain* whether Gilles could solve any of these problems by using `setvbuf` with the `_IONBF` value for *mode*.

Question 3: Resource Management & File Permissions (10 points)

When a file is created using the POSIX `creat` system call, the calling program must specify file permissions for the resulting file. However, the ANSI C `fopen` function call can also be used to create files yet it has no parameters for specifying file permissions. Given those facts, if `fopen` is used to create a file, how does a UNIX OS determine the file permissions for the resulting file?

Question 4: Directories & Permissions (20 points)

A. **Explain** one way in which the use of hard links could complicate a user's ability to manage the privacy/security of data.

B. **Explain** one way in which the use of soft links could provide much of the same functionality as hard links but without the management issue you described in Part A.

Question 5: Files & Disk Scheduling (20 points)

A. **Explain** why file fragmentation on disk is inevitable in a general purpose OS.

B. **Explain** why file defragmentation is likely to speed disk I/O for one disk scheduling algorithm.