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: Memory Management and Hardware (30 points)

A. **Explain why** hardware support is necessary for efficiently relocating *code* within main memory.

B. **Explain why** hardware support is necessary for efficiently relocating *data* within main memory.

C. Describe one type of hardware support that can be used for efficiently relocating processes within main memory.

D. Give one example of when the type of hardware support you described in part C is used.

E. Describe a second type of hardware support that can be used for efficiently relocating processes within main memory that is an alternative to the one you described in part C.

F. Give one example of when the type of hardware support you described in part E is used.

Question 2: Resource Management and Privileges (20 points)

A. **Explain why** hardware support is necessary for enforcing system privilege levels.

B. Describe a type of hardware support that can be used for enforcing system privilege levels and **explain why** it is useful.

Question 3: Signals (30 points)

The signals you list in parts A, B, and C of this question must all be different.

A. List one POSIX signal which a process can send to *itself* and **explain** one situation in which it might want to do this.

B. List one POSIX signal *besides SIGCHLD* which a process can send to *its parent* and **explain** one situation in which it might want to do this.

C. List one POSIX signal *related to interprocess communication (IPC)* which *the OS* may send to a process and **explain** one situation in which it might want to do this.

Question 4: Interprocess Communication (20 points)

One characteristic of the interprocess communication (IPC) conduit created using the `pipe()` system call is that if a process accessing the pipe closes one end of the pipe, the descendants of that process can never open that end of the pipe.

A. List and **explain** one *benefit* to *application programmers* of having this behavior regarding this IPC type.

B. List and **explain** one *benefit* to *operating system programmers* of having this behavior regarding this IPC type.

C. List and **explain** one *limitation* to *application programmers* of having this behavior regarding this IPC type.

D. List and **explain** one method an application programmer could use to get around the limitation you gave in part B, which still uses pipes for IPC.

Question 5: Textbooks (10 *bonus* points)

A. Give the name, authors' names, publisher, and year for the textbook you primarily used to understand the theoretical elements of this course.

B. List and **explain** one aspect of this book that you found useful in understanding the theoretical elements of this course.

C. List and **explain** one aspect of this book that you believe could have been improved to help you understand the theoretical elements of this course.

D. **Explain** what letter grade would you assign to this book overall.

Question 6: Textbooks (10 *bonus* points)

A. Give the name, authors' names, publisher, and year for the textbook you primarily used to understand the programming assignments for this course.

B. List and **explain** one aspect of this book that you found useful in understanding the programming assignments for this course.

C. List and **explain** one aspect of this book that you believe could have been improved to help you understand the programming assignments for this course.

D. **Explain** what letter grade would you assign to this book overall.