EE 3233 System Programming for Engineers - Summer 2025

Exam 1

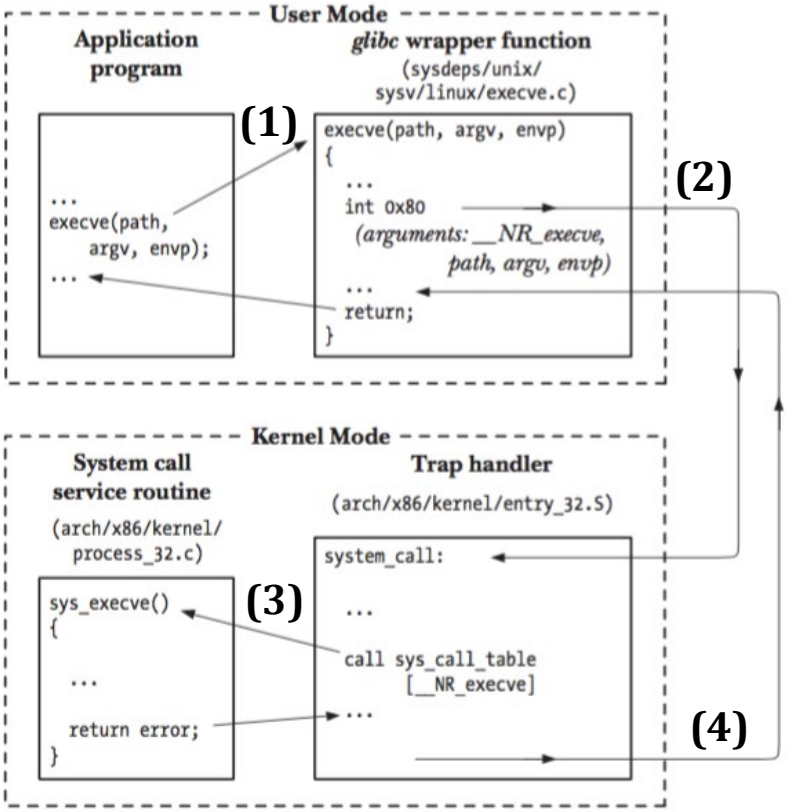
(Monday, June 16)

Name: _____ Score: _____ /120

I. Multiple Choice (Each 10 points)

1. Choose one, which is NOT a task performed by the kernel.
   - ☐ a. Memory management
   - ☐ b. Creation and termination of process
   - ☐ c. Compilation of program
   - ☐ d. Provision of a file system

2. Following figure shows the steps in the execution of a system call, *execve( )*. In which step the actual *execve( )* is executed?
   a. (1) ☐ b. (2) ☐ c. (3) ☐ d. (4) ☐



3. Which statement about the clearenv() function is true?
   - ☐ a. It retrieves the value of all environment variables.
   - ☐ b. It adds a new environment variable.
   - ☐ c. It removes a specific environment variable.
   - ☐ d. It erases all environment variables.

4. Choose an INCORRECT statement about the memory layout.

☐ a. 'Text' segment contains machine-language instructions of the program
☐ b. 'Data' segment contains global and static variables
☐ c. 'Stack' segment dynamically grows and shrinks
☐ d. 'Heap' segment is used to allocate memory at compile time

II. Choose [T] for True or [F] for False [F] (Each 5 points)

1. When running in Kernel MODE, a CPU can access memory that is marked as userspace. [T]☐ [F]☐

2. A **process** is an instance of an executed program. [T]☐ [F]☐

3. Two **processes** typically use the same memory space? [T]☐ [F]☐

4. A function contains more than one stack frame? [T]☐ [F]☐

5. The advantage of separating the virtual address space from the physical address space is isolating processes from one another to prevent one process from accessing the memory of another process. [T]☐ [F]☐

6. ***void free(void *ptr)*** deallocates the block of memory pointed to by ***ptr*** and adds the block of memory to a list of free blocks for re-use. [T]☐ [F]☐

7. When ***malloc( )*** allocates the block, it allocates extra bytes to hold the size of the block [T]☐ [F]☐

8. The expected output when you run the following **Python** script is [(2,3), 'xy'].

```
>>> t=[3,4.1,(2,3),'xy']
>>> print(t[2:])
```

[T]☐ [F]☐

III. Fill in the blank(s) in each statement.

1. Each time a function calls another function, stack frame or activation record is pushed onto the stack. This entry contains ( ) to go back to its caller, and ( ) and ( ) – 10 points

2. On x86_64 the stack grows in a ( ) direction and the heap grows in a ( ) direction – 10 points