CSCI 40300/ECE40800
Operating Systems—Fall 2016
Quiz 1
Solutions

Name: ______________________________

Question:	1	2	3	Total
Points:	2	4	4	10
Score:				

Normalized Total to 100 = 100 × Total/10 = __________ (what will appear in OnCourse gradebook).

1. (2 points) Consider system calls and function calls within a user program. What is one major difference in the two types of calls?

   Answer: In system calls, the OS changes to kernel mode. In function/subroutine calls it remains in user mode.

2. For each of the following operations/instructions, indicate whether they are privileged or not. In the anwerline right P (for privileged) or N for (non-privileged).

   (a) (1 point) Change memory management registers.

   (a) ___*P*___

   Answer: Changing memory management registers would allow a process to access memory locations it was not allowed to access.

   (b) (1 point) Write the program counter.

   (b) ___*N*___

   Answer: Writing the PC is no different than executing an unconditional jump instruction in a user process. It happens as part of normal programs.

   (c) (1 point) Read time-of-day clock.

   (c) ___*N*___

Answer: Although direct access to devices is in general unwise, read access to the clock would not be harmful.

(d) (1 point) Set the time-of-day clock.

(d) ______***P******______

Answer: Changing the clock could disrupt scheduled events and CPU scheduling algorithms, so normally is is a privileged operation.

3. (4 points) Name *two ways* in which the processor can transition from user mode to kernel mode. Can the user execute arbitrary code after transitioning to kernel mode?

Answer:

- The user program can execute a trap instruction (for a system call)
- The user program can perform a synchronous exception (bad address, bad instruction, etc)
- The processor transitions into kernel mode when responding to an interrupt.

The user cannot execute arbitrary code because entry to kernel mode is through a restricted set of routines in the kernel — not in the user's program.