CS 314-002 Operating Systems  
Spring 2019  
Quiz #1 on January 24, 2019 (SOLUTIONS)

Your Last Three Digits: ________________ 
(please do NOT write all of your student ID or your name)

Grade: ______

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(1) What are the two primary roles of operating systems?

- Operating systems as *middlemen* between high-level commands (human users or user applications) or operating systems as *extended machines* (+5 points)
- Operating systems as *government* for system resources in a computer systems or operating systems as *resource managers* (+5 points)

(2) What is “extended machine”? This question does not ask how we can use extended machine. A definition of “extended machine” is needed.

An imaginary computer (as a hardware computer) that can be manipulated directly by high-level user commands by abstraction offered by an operating system.

(3) What problem in “batch system” do “multi-programming (multitasking) OSes” fix and how?

The problem multitasking OSes fix is “low processor utilization”. Multitasking operating systems improve processor utilization by loading multiple programs into memory and whenever the current process does not use the processor, the processor is switched to another program that needs a processor.

*: Since batch systems execute one program at a time, its processor utilization is usually low (as we discussed in the classroom.

**Note**: “the capability to fix bugs after a program crashes by a software bus” is not the problem “multitasking OS” fixes. It is the problem “timesharing systems (timesharing multitasking OSes) fix.”
(4) What problem in “multi-programming (multitasking) OSes” do “multitasking timesharing OSes” fix and how (note: this question consists of two questions – make sure to provide a solution for each (“what” and “how”))? 

**What:** In any operating systems before timesharing systems were introduced, programs that stop running because of some software bugs are kicked out from the memory. Users have to resubmit their programs for execution after they fix their bugs.

**How:** The above advantage is achieved by time-sharing systems, because users will no longer be out just because the program stops running because of bugs as long as the user maintains the connection.

(5) Look up the meaning of the following word using your textbook: “degree of multitasking”.

The term, “degree of multitasking” means the number of programs (processes) a multitasking OS loads to the main memory at a time. If “the degree of multitasking” is too low, the system’s processor utilization will be low.