Chapter 3 - Study Guide

1. Computer systems consist of hardware and software. A big part of the software is the operating system.
    - What is the overall purpose of an operating system?
    - Using your answer, discuss how the _____ contributes to or is involved in accomplishing that purpose.
        - User interface
        - File manager
        - Device drivers
        - Memory manager
        - Scheduler and dispatcher
        - Boot loader

2. What is the distinction between application software and system software?

3. Why is a boot loader necessary? In other words, why can't the computer just start the operating system as soon as it is powered on?

4. Suppose we have an OS that runs each process one at a time from start to finish without interruptions. Why would this be unsuitable for a modern laptop user? In what context might this type of behavior be ok?

5. What complications could arise in an operating system if two processes require access to the same file at the same time? Are there cases in which the file manager should grant such requests? Are there cases in which the file manager should deny such requests?

6. If a flaw in an operating system's security allows a malicious programmer to gain unauthorized access to sensitive data, to what extent should the developer of the operating system be held responsible?

7. Commercial airliners and modern cars run entirely at the operating system and driver code level. They interface with the system and expect the system to take control if an unsafe situation is detected. For example, a car may take control to keep a driver from drifting out of their lane, and an airplane may take corrective action not to stall if it notices the airplane has too steep of an angle. Unfortunately, this type of corrective action may still occur even if sensors are malfunctioning, causing loss of life. (See Boing 737 MAX) Please explain the tradeoffs between the plane/vehicle taking automatic corrective action versus only displaying a warning. When is one appropriate over another? Does your answer change if there is a sensor malfunction, and how would we detect such a problem?