1. Direct memory access (DMA) is used for high-speed I/O devices in order to avoid increasing the CPU's execution load.
   (a) (10 points) How does the CPU interface with the device to coordinate the transfer?
   (b) (5 points) How does the CPU know when the memory operations are complete?
2. (10 points) Describe the two modes of operation in modern operating systems.
3. (10 points) Describe a mechanism for enforcing memory protection in order to prevent a program from modifying the memory associated with other programs.
4. (10 points) List six major categories of system calls.
5. (20 points) Write a review for the paper "Exokernel". Your review should contain: 1) one or two sentence summary of the paper; 2) Descriptions of the problem that the authors were trying to solve; and 3) A summary of the contributions of the paper.
6. (5 points) Which command in Linux can provide detailed information on system calls?
7. (20 points) Describe the actions taken by a kernel to context-switch between processes.
8. (5 points) The `fork()` system call creates a new process by duplicating an existing one. The process that calls `fork()` is parent, whereas the new process is child. How do you decide the current process is a parent or child after calling `fork()`?
9. (10 points) Describe the technique, simultaneous multithreading or hyperthreading, that is a hardware technique to improve system performance.