1. **Question:** In a multiprogramming and time-sharing environment, several users

share the system simultaneously. This situation can result in various

security problems.

1. When sharing a multiprogramming and time-sharing environment. It poses many risks for the system. There is a chance for people to steal and copy user files. Files that do not belong to that person. Another instance is when someone saves over work that has been completed. A good example that was given in class was when resource management isn’t implemented, and 2 people try and print. This causes an overlapping issue.
2. There is no way to ensure that any sort of protection is better than the other. Since both systems are implemented by people. There are chances that it may become broken into. Hence, why security becomes more complex.
3. **Question:** What is the purpose of interrupts? How does an interrupt differ from a

trap? Can traps be generated intentionally by a user program? If so, for

what purpose?

* An interrupt is generated by a hardware device. It’s general purpose is executed when a halt instruction is sent to the hardware. Meaning that it has either stopped its execution or paused for a moment.
* Some examples about the differences are:
  + Interrupt is a hardware signal vs a trap being software interrupt.
  + Interrupt are handled by jump statements vs traps are not able to handle it.
  + Interrupts are asynchronous vs traps being triggered by current program instructions (synchronous).

1. **Question:** Direct memory access is used for high-speed I/O devices to

avoid increasing the CPU’s execution load.

**a**. How does the CPU interface with the device to coordinate the

transfer?

**b**. How does the CPU know when the memory operations are complete?

**c**. The CPU is allowed to execute other programs while the DMA

controller is transferring data. Does this process interfere with

the execution of the user programs? If so, describe what forms

of interference are caused.