**Chapter 5 Homework Questions -** answer the questions below and the assigned problem.  (2 points per question - 20 points total)

1.  Explain the difference between block and character devices and give an example of each.

A block device would be something like a hard drive that would be read in blocks or sectors while a character device would be read char by char such as a keyboard. Character devices are more commonly thought of as streaming devices that maintain and constant input/output flow. Block devices on the other hand, can be accessed and closed when needed.

2.  Explain how a DMA I/O controller works.

The Direct Memory Access for I/O devices allows the CPU to not have to interrupt everything it’s doing to handle the devices. The DMA sits on the shared systems BUS and will collect information about the I/O device and begin to store it in memory. This frees up the CPU to continue to do it’s work.

3.  What is an interrupt vector?

The interrupt vector is he memory location of the interrupt handler, which prioritizes interrupts and puts them in queue when there are more than one waiting.

4.  What is buffering and does it affect operating system performance?

Buffering is used to store information to be processed in an intermediary area as not to slow down the system. This is commonly used for input/output devices to keep streams from constantly writing to memory. This usually affects the performance in a good way.

5. Compare Programmed and Interrupt Driven I/O.

Programmed I/O (PIO) is used for data transfers that are driven by the CPU and driver software. The CPU will issue the command then wait for the I/O device to return. The biggest problem with this is that the processor is much faster than the device so it tends to wait a long time. Interrupt driven I/O (IIO) will have the CPU issue a command to the I/O device then continue with it’s work. Once the data is ready to be transferred by the CPU it will interrupt and ask to be moved. This process suffers with large amounts of data.

6.  What is a device driver and how do they increase the flexibility of an operating system?

Device drivers serve a few different purposes including initializing devices, talking between the devices and the OS, adding functionality to devices, freeing up the system by condensing communication.

7.  What is spooling and can you give an example?

Spooling refers to placing jobs into a buffer so that the device can access them when it’s ready. This increases efficiency because devices access data at different rates. Print spooling is a common example and refers to how documents are loaded into a buffer where the printer can pull them off at it’s own speed.

8.  Describe the three factors that determine how long it takes to maneuver a disk arm in order to read/write data to a hard disk.

Rotational latency, bit rate and seek time are three factors that contribute to the time it takes to read or write off of the hard drive. Seek time refers to the amount of time it takes the head assembly to reach the data. The Rotational latency is the difference of where the data is and where the head was when it started. The bit rate is the data transfer rate once the head is in place and the delay that it creates.

9.  Compare the First-Come, First Served to (FCFS) and Shortest Seek First (SSF) disk scheduling algorithms.

The FCFS refers to a system of reading that processes the first thing first and goes in a queue after that. If the data in between each is really spread out then the speeds will be very slow since it has to go in-between each one (the full length). Shortest-Seek looks for the shortest distance between data and creates the fastest from piece to piece but also creates a possibility of starvation if there are a huge number of requests.

10.  Explain what a Graphical User Interface (GUI) is and how it has changed operating systems.

The GUI was created in order to hide the operations of the operating system and create a more friendly interface for the user to interact with. The GUI has also created a larger emphasis on Object oriented programming placing heavy stress on the GUI appearing as objects as they would in real life; skeuomorph.

**Chapter 5 problems.**  Answer problems 13, 18, and 24 on pages 427-432.  The problem is worth 3 points (9 points total).

13. A system program that combines the separately compiled modules of a program into a form suitable for execution

This is considered a linking loader.

18. To avoid the race condition, the number of processes that may be simultaneously inside their critical section is

Usually only one.

24. Which of the following refers to the associative memory?

There is no need for an address