CS460 Review Sheet

This list is NOT comprehensive!

Definition of OS.

List and describe:
- (Human) User's goals
- System's goals

Describe each step in the Computer Startup Sequence from power on to login.

Why is a shell separate from the kernel?

Give three specific tasks the kernel is in charge of.

Give three specific tasks the kernel is not in charge of.

Why is Linux more properly called GNU/Linux? What parts are Linux and what parts are GNU?

Define Interrupts
- Give examples of different types of interrupts. Hardware, Software

System Configurations
- How does a single versus multi-CPU system change the requirements for the OS?
- How does a multi-CPU system differ from a single CPU multi-core system?

What is multitasking? Why is this important?

Process
- What is a process?
- Draw the process memory map.
- What kernel data structures are used to manage processes?
  - Give three specific examples of data that is kept in this structure.

In terms of CPU scheduling, what states could a process be in? What causes a process to move into and out of each of these states?

What is an IO bound process? What is a CPU bound process?

How is system() different than exec()?

Describe what a Dual Mode CPU is. How is dual-mode implemented? How it is used?

Describe how a system call in Linux works? Specifically, what happens when you call fork? Why is a system call required to write data to the disk?

What is context switching? Why is it important? Describe the process. Specifically talk about what data needs to be stored during a context switch and where this data is stored. Why do you want to have as few context switches as possible?

Describe some of the common ways data can be passed between processes. What are the advantages and disadvantages of each?

Why, if you malloc one byte on the heap, does Linux often increase the heap size by 0x1000 bytes or more?

How does the loader ineract with an ELF file?

Why is Address Space Layout Randomization useful?

Based on what we did in class, do you think the file system is part of the OS kernel? Why or why not?

Why would you want to put your code into a shared library, such as libCS460.so?

Where is the printf() function implemented?

Is printf() a system call? Justify your answer.

Why is it advantageous for physical devices (/dev/sda, /dev/tcp) to be represented as a virtual file in Linux?

How big is a pointer on your Minimal-Arch Linux virtual machine? What C data type can represent this data?

Is the following output from strace or ltrace? What code in your program likely caused these two lines to be output?

```
brk(0)                                  = 0x603000
brk(0x624000)                           = 0x624000
```

Linux Command Line

What operations do each of the following characters perform on the Linux command line?

> < & ;

Explain exactly what each piece of the following command string is doing. What is the purpose of the pipe | ?

ls *.txt | grep Review

Explain exactly what each piece of the following command string is doing. How is this command string different from the command string above?

ls *.txt | xargs grep Review

If you see this line in a bash script:
`files=$(ls *.txt)`
what do you expect to happen? For full credit, describe **`files`**, **`the $()`** and **`ls *.txt`**