ECS 150 Written Homework #1

Due date: Beginning of lecture on Thursday, May 17th

1. What are the two primary responsibilities of an operating system?
2. System calls are part of the _____ half of the kernel.
3. New processes are usually spawned using the _____ system call.
4. Yes or no: will the following code successfully run firefox and print out its return status when finished? If it won't, why not?

```
{
    int ret;

    ret = execve("/usr/bin/firefox", NULL, NULL);
    if (ret == 0)
        printf("Firefox ran successfully.\n");
    else
        printf("Firefox crashed.\n");
}
```

5. Saving the CPU state of a process and loading the saved state of another process is called a _____
6. List the three possible states of a process in the operating system (do not count "NEW" and "DEAD" as valid states).
7. What is a realtime process?
8. Describe in 1-2 sentences the difference between processes and threads.
9. Pthreads is an example of a thread (interface / implementation)?
10. Describe in 1-2 sentences how Virtual Round Robin scheduling differs from traditional Round Robin scheduling.
11. What is the "nice" value of a process? How does it affect scheduling under the 4.4BSD scheduler?
12. The ULE scheduler makes use of three queues for each CPU. Name them.
13. For project #1, the pfind() system call was used to lookup a process given its PID. Assuming pfind() returns a valid process structure, what does the kernel programmer have to do before his code returns to userspace to prevent kernel crashes?
14. The _____ system call can be used to ask the operating system to send a signal to the current process after a specified number of seconds have elapsed.
15. Dynamic partitioning as a form of memory allocation is susceptible to _____ fragmentation.

16. Suppose we have a machine with 16-bit virtual addresses and a page size of 2k. There are 8 frames of physical memory available.
    - What is the size of the virtual address space in kb?
    - What is the size of the physical address space in kb?
    - How many bits of each memory address are used by the offset?
    - How many pages of virtual memory are there?