Intro to OS Exam 1

1. Reproduce the process state chart from class. (10pts)
2. Explain what each of the following commands do, as well as which operating system uses them (1.5 pts each):
   1. ls – short list of files within a location; Linux
   2. Cd – changes directory user is searching in; Windows and Linux
   3. Grep – used to process text; Linux
   4. Dir – used to view a list of files in a location; Windows
   5. Type – used to view contents of a file; Windows
   6. Cat – used to view contents of a file; Linux
   7. Ps – used to see the current processes running; Windows
   8. Mv – used to move a file from one location to another; Linux
   9. Robocopy – used to copy files/directories from one location to another; Windows
   10. Sed – used to move files to a different location; Linux
   11. Sudo – used to access permission to execute certain commands; Linux
   12. Chmod – used to change the modes a file is in; Linux
3. What is an environment variable? What does the PATH environment variable contain? (4 pts)  
   An environment variable is a value that will affect the way a process runs and behaves on a computer. The PATH environment variable contains the list of directories that lead to a certain file or executable program.
4. What are the 4 major jobs of a modern operating system? (4 pts)  
   1. Process Manager – create, schedule, suspend, terminate tasks

2. Memory Manager – allocate, keep track of, and deallocate memory of tasks

3. File System Manager – create, open, close, delete, rename, and manage files

4. Device Manager – manages devices, such as disk devices, printers, etc

1. In memory management, what is the role of a 'dirty bit', and why do we keep track of it? (3 pts)  
   The role of the “dirty bit” is to indicate whether or not a specific block of memory has been modified or not. We keep track of it because it allows the CPU to check the corresponding dirty bit of a block of memory to see if the block need to be saved to secondary memory before getting replaced or removed.
2. What is meant by the term 'user mode', and what is meant by the term 'kernel mode'? (4 pts)  
   User Mode: a non-privileged mode where each process begins at. It’s not allowed to access the portions of memory that have been allocated to the kernel.

Kernel Mode: A mode where the code has unrestricted access to the hardware. It’s allowed to execute any CPU instruction and reference any memory address.

1. What is a working set? (2 pts)  
   Set of pages that must be in real memory to get work done for period of time
2. What is the first line of every bash script? (2 pts)  
   #!/bin/bash
3. What is the permission string (RWXRWXRWX format) of the number 311 (2 pts)  
   -WX –X –X
4. What is the base directory of a file system called on windows (1pt), and on Linux (1 pt.).

Windows: The individual drive letters

Linux: The root

1. What does the term 'super user' mean in terms of operating systems (2 pts).  
   Super user means the user has administrator rights (elevated privileges)

8) EXTRA CREDIT: (3 pts)  
You have been hired to test the capacity of Al Harrington's ShatterProof Snibbets to work after they are dropped from large heights. You have been given 2 Snibbets, and access to a 100 story building. You need to determine the maximum floor the Snibbets can be dropped from without shattering. How can you do this? Can you do it in less than 15 test drops?

Start at the 14th level. If it breaks, start at 1st level and work your way up to the 13th. If it didn’t break at the 14th level, add 13 and test the 27th level. If it breaks, start at 15th level and test up to the 26th level. If it didn’t break at the 27th level, add 12 to reach the 39th level. If it breaks, repeat the same process aforementioned. If it didn’t break, repeat the aforementioned process for when it doesn’t break by adding 11, 10, 9, etc. until you reach 1.