Important: This is an open book test. You can use any books, notes, or paper but no electronic device. *Do not log into the computer during the test*. Any calculations and rough work can be done on the back side of the test pages. If there is a syntax error in any program segment, just write it down and you will get full credit for the problem. You will lose five points for not writing your name.

1. [5 pt] I am editing a file using `vi` in which I have to modify some occurrences of the pattern `fubar` to `foobar`. However, I am not sure about which occurrences to modify but can tell the same if I look at the line containing that pattern. How will I go about doing it without having to repeatedly issue the search and replace command?

2. [5 pt] What is the difference between shell [built-in] commands and Unix commands? Give one example of each type. Is there a Unix command that is also a shell built-in?

3. [4 pt] Let us assume that I am writing a script in Korn shell that creates files in `/tmp` directory. It is possible that the script is run by multiple users and also, that the same user runs the script many times concurrently. How can I make sure that the file name used in the script does not cause a problem with multiple invocations of the script.

4. [8 pt] I just created two files from within a program (say, `netscape`) whose names were accidentally given as `L&>TXT` and `L*>TXT`. I actually wanted to name then `L7.TXT` and `L8.TXT` but had my shift key pressed that caused the names to be what they appear. I thought I could rename them using `mv` but this is what happened when I tried to do it:

```
 219 sanjiv-aryabhat ls -l L*
   0 -rw-r--r--   1 sanjiv          0 Feb 10 11:54 L&>TXT
   0 -rw-r--r--   1 sanjiv          0 Feb 10 11:52 L*>TXT
 220 sanjiv-aryabhat mv L&>TXT L7.TXT
mv: Insufficient arguments (1)
Usage: mv [-f] [-i] f1 f2
       mv [-f] [-i] f1 ... fn d1
       mv [-f] [-i] d1 d2

[1]    Exit 2                        mv -i L
L7.TXT: Command not found.
 221 sanjiv-aryabhat mv L*>TXT L8.TXT
 mv: L8.TXT not found
 222 sanjiv-aryabhat ls -l L*
   0 -rw-r--r--   1 sanjiv          0 Feb 10 11:54 L&>TXT
   0 -rw-r--r--   1 sanjiv          0 Feb 10 11:52 L*>TXT
 223 sanjiv-aryabhat
```

After issuing these commands, I saw that I also have a file named `TXT` in my directory that just got created. Can you help me? Since I want to learn, I'll also prefer an explanation of the phenomenon.

5. [4 pt] It is generally recommended that you should not use the directory `.` as the first directory in your PATH. Why is it so?

6. [6 pt] In class, I had showed you how to write the command `find` so that `stderr` is ignored from the output. However, I have pressing need for an application where I need to save the output of `find` as well as all the error messages to a file called `find_out`. Let us say that I am searching for the file `foobar` starting from my home directory. How will you achieve this? Specify the shell you used for the command syntax.

7. [6 pt] What is the difference between a program, a process, and a file in Unix?