CSCI 274 – Intro to Linux Final
PRACTICE EXAM

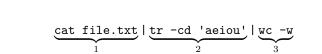Name: _____

1. Answer these questions about your editor of choice (`vim` or `emacs`). `vim` users, assume you are in normal mode.

   (a) (2 points) What keystrokes would you use to delete from the current cursor position to the end of line?

   (b) (2 points) Assume your cursor is at the beginning of a word. What keystrokes would you use to change the word to `LINUX`?

   (c) (2 points) What keystrokes would you use to replace all instances of `WINDOWS` with `LINUX` in the current buffer?

   (d) (2 points) What keystrokes do you use to close your editor **without saving**?

2. For each stage of the following pipelines, explain what each stage does, then explain what entire pipeline computes.

> For example:
>
> $$\underbrace{\texttt{cat file.txt}}_{1} \mid \underbrace{\texttt{tr -cd 'aeiou'}}_{2} \mid \underbrace{\texttt{wc -w}}_{3}$$
>
> You might write: *Command 1 prints the file $\texttt{file.txt}$ to stdout, command 2 deletes things that are not vowels, then command 3 counts the number of words. Overall, this pipeline counts the number of words in $\texttt{file.txt}$ which have vowels.*

Grading note: You will be given 1 point for each stage of the pipeline you correctly explain, and 2 points for a correct overall explanation.

(a) (5 points) $\underbrace{\texttt{cat file.txt}}_{1} \mid \underbrace{\texttt{grep '\^\$'}}_{2} \mid \underbrace{\texttt{wc -l}}_{3}$

(b) (5 points) $\underbrace{\texttt{cat wonderland.txt}}_{1} \mid \underbrace{\texttt{grep -v Alice}}_{2} \mid \underbrace{\texttt{wc -l}}_{3}$

(c) (7 points) $\underbrace{\texttt{cat file.txt}}_{1} \mid \underbrace{\texttt{sort}}_{2} \mid \underbrace{\texttt{uniq -c}}_{3} \mid \underbrace{\texttt{sort -n}}_{4} \mid \underbrace{\texttt{sed -n '\$p'}}_{5}$

17 points on this page

3. Consider the following interaction at the terminal:

```
[jrosenth@toilers:/var/www/toilers]$ ls -l
drwxrwxr-x  6 crader   rmcwic   4096 Jan 16  2010 ccwic10
drwxrwxr-x  3 tcamp    toilers  4096 Oct 31  2009 Code
drwxrwxr-x  2 tcamp    toilers  4096 Apr 12  2007 Contact_us
drwxrwxr-x  2 tcamp    toilers  4096 May 14  2008 Downloads
drwxrwxr-x  2 jrosenth toilers  4096 Oct 12 11:31 Images
-rw-rw-r--  1 tcamp    toilers  3067 Oct 31  2016 index.html
drwxrwxr-x 11 acoles   csgames  4096 Feb 19  2017 jeopardy
-rw-rw-r--  3 tcamp    toilers  2060 Oct 31  2016 navi.css
drwxrwxr-x  5 tcamp    toilers  4096 Apr 17  2015 Publications
drwxr-xr-x  5 jrosenth rmcwic   4096 Aug 24 12:41 RMCWiC
drwxrwxr-x 12 crader   unplug   4096 Aug 12  2013 Unplugged
lrwxrwxrwx  1 jrosenth toilers  18   Oct 12 11:29 toilers.png -> Images/toilers.png
```

(a) (2 points) What is the user of the `Unplugged` directory?

(b) (2 points) What is the group of the `jeopardy` directory?

(c) (2 points) What **ONE** octal digit represents the permissions of the group of the `navi.css` file?

(d) (3 points) How many hard links are there to the inode of `navi.css`?

(e) (2 points) Is `toilers.png` a hard or soft (symbolic) link?

(f) (4 points) Write **one command** to create a soft link called `home.htm` that points to `index.html`.

4. (8 points) Write a `bash` script that behaves like the one in the terminal session below.

```
[jrosenth@isengard:~/counter]$ ls
computers.txt   counter.sh   unix.txt
[jrosenth@isengard:~/counter]$ cat computers.txt
Macintosh SE/30
Macintosh LC II
Macintosh Quadra 840av
Apple IIgs
[jrosenth@isengard:~/counter]$ cat unix.txt
Research UNIX AT&T UNIX SVR4
BSD FreeBSD NetBSD NeXTSTEP Mac OS X
Linux
[jrosenth@isengard:~/counter]$ bash counter.sh computers.txt
There are 4 lines in computers.txt.
There are 10 words in computers.txt.
The most frequent word is Macintosh.
[jrosenth@isengard:~/counter]$ bash counter.sh unix.txt
There are 3 lines in unix.txt.
There are 13 words in unix.txt.
The most frequent word is UNIX.
```

5. **True or False?** Write T or F for each of the following statements depending on whether the statement is true or false.

   (a) (2 points) ____ Hard links can link to directories, whereas soft links cannot.

   (b) (2 points) ____ Soft links can cross file system boundaries, whereas hard links cannot.

   (c) (2 points) ____ Hard links link to file names, whereas soft links link to inode numbers.

   (d) (2 points) ____ Soft links will continue to work after the original file moved or deleted.

6. (6 points) Consider the following output from your terminal:

```
$ ps u
USER        PID %CPU %MEM    VSZ    RSS TTY      STAT START   TIME COMMAND
jrosenth  8813  0.0  0.0  41716   5680 pts/1    Ss   Nov27   0:00 zsh
jrosenth 11561  0.0  0.2 259304 34500 pts/1    Sl+  Nov27   1:33 weechat
jrosenth 25383  0.0  0.0  51588   6488 pts/3    S+   Dec03   0:00 mutt
jrosenth 28609  0.0  0.0  35844   3172 pts/2    R+   07:30   0:00 ps u
```

Write **one command** to end the `weechat` command's process.

7. (2 points) As a set of octal digits, what `umask` should be used such so that new files created have octal permissions `640` and new directories created have octal permissions `750`?