Cheat-Sheet for Unix, Vim, and more

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| **Command** | **Description/Examples** |
| ls | ‘List’ command. Lists all the files in the directory you are currently in. A directory is like a folder; it can contain files, programs, and more folders. When you first log in to carrie, you will automatically be taken to your ‘home’ directory. |
| pwd | ‘Print working directory’ command. Tells you the name of the directory you are currently in. The full name of a directory is also called its path, and it is like a map to the directory. For example, the full name of my personal home directory on carrie is ‘/home/jay’. I have a directory in my personal home directory called ‘Desktop’, and its path is ‘/home/jay/Desktop’ |
| cd | ‘Change directory’ command. Changes from the directory you are currently in to a new directory that you must specify. For example, lets say I am in my home directory and I want to go to my Desktop directory, I would type ‘cd Desktop’. **This is a shortcut that works only when the directory you want to move to is inside your current working directory!** In general, you must specify the entire path name: ‘cd /home/jay/Desktop’ |
| mkdir | ‘Make directory’ command. Issue this if you want to create a new directory. For example, if I am in my Desktop directory and I want to make a new directory called ‘Code’ that sits inside Desktop, I could say ‘mkdir Code’. Again, this will make the directory inside your current working directory. In general, you can make the new directory in any desired location by specifying its full path. |
| vim | This is the name of a text editor, you use it to write and edit text. The text you will typically write and edit in PChem Lab is computer code to do calculations. Lets say the code I want to edit is in a file called ‘Quantum.c’; to edit this file with vim, I would issue the command ‘vim Quantum.c’ |
| g++ | ‘Gnu c/c++ compiler’, used to translate the code you write into instructions the computer can understand. To compile the code in Quantum.c to a program called Quantum.exe, type ‘g++ -o Quantum.exe Quantum.c’ |
| cp | Copyy command, use to copy one file to another file. Issue by saying ‘cp file1 file2’ where ‘files1’ is the name of the existing file you want to copy and ‘file2’ is the name of the new file you want to copy file1 to. |

Once you have compiled your code to make a program (for example, the program Quantum.exe), you can run the program by typing ‘./Quantum.exe’

**Important Note: Every time you make a change to your code (e.g. every time you change anything in Quantum.c), you MUST compile it again for that change to show up in your program (Quantum.exe)!**

The following are some notes on using vim to write/edit text files. There are two important modes you can be in when using vim: Command Mode and Insert Mode. Insert Mode allows you to write and edit text. You want to be in insert mode when you are writing code, i.e., most of the time! Command mode allows you to save your changes, exit the program, navigate around the page, search key words, and many more things. You want to be in command mode when you are finished writing code and want to save your changes, or when you want to jump from one block of code to another in a smart way. Here is a cheat-sheet of how enter/exit command and insert mode, and different things you can do in each

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| **While in Command Mode** | **Description/Examples** |
| i | Typing ‘i’ while in Command Mode will take you into Insert Mode. You should see the word ‘Insert’ appear at the bottom of your screen when you type ‘i’ from Command Mode. If not, type ‘i’ once more. |
| :wq | Quit and Save changes |
| :w | Save changes |
| :q! | Quit without saving changes |
| gg | Go to the first line of your file |
| G | Go to the final line of your file |
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| **While in Insert Mode** | **Description/Examples** |
| Esc | Perssing the ‘Esc’ key while in Insert Mode will take you to Command Mode |
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**Complex Numbers**

In general, a complex number ***z***has the form

***a***is the real part and ***b*** is the imaginary part, ***i***is the imaginary unit, defined:

The following relations may be useful relating to the imaginary unit:

**The squared magnitude of a complex number**

**The absolute value of a complex number**

**Here z’ denotes the *complex conjugate of z:***

If , then the complex conjugate of *z* is

**Complex functions**

In quantum mechanics, the wavefunctions will often involve the following complex function

( b is just a real number )

There is a definition for this function called the Euler relation:

The squared magnitude of this function:

The first derivative of this function:

The second derivative of this function:

Integral of this function:

(c is a real constant).