Installing and using Virtual Environments in Python

1. First, you must be using Python 3.6 or greater. If you are on the lab machines, this is true. You can verify with `python3 --version`.

2. Now go to your cs134 directory (cd ~/cs134 and press return in the Terminal) and create the virtual environment in your cs134 folder (assume the % is the prompt in the Terminal):

   ```
   % python3 -m venv --system-site-packages venv
   ```

3. The phrase `--system-site-packages` indicates that you want to extend the environment you already have set up on your machine. The specification of the directory (`venv`) simply indicates where the environment is to be installed. Installing it in your cs134 folder makes it easy to access in all of your future labs.

4. We now activate this new environment:

   ```
   % source venv/bin/activate
   (venv) % python --version
   Python 3.7.0
   ```

5. If the activation worked, you’ll see your usual prompt, prefixed with the name of the folder that contains your virtual environment. In addition, python now refers to python3. The source command above is simply saying “execute the commands found in the activate script in the bin subdirectory.” Those commands changed your prompt, and toldbash (your Terminal) where to install new modules. Once an environment is activated, you can deactivate it (if you want to) by typing `deactivate`. Don’t do that now though! If you do deactivate later, everything will go back to Python’s “normal” behavior.

6. New Python modules are installed using pip (a silly recursive acronym for "Pip Installs Python"). We would like to install the non-standard package, matplotlib:

   ```
   (venv) % pip install matplotlib
   ```

7. The first time you import matplotlib, it does some one-time initialization, like building fonts that work specifically with your machine. We’ll force matplotlib to build those fonts now to save time later:

   ```
   (venv) % python
   >>> import matplotlib.pyplot as plt
   UserWarning: Matplotlib is building.... This may take a moment. ... 
   >>> quit()
   ```

8. Now you can cd into your lab06 directory and begin working on your lab. (NOTE: each time you open a new terminal you will need to reactivate your virtual environment from your cs134 directory using the `source venv/bin/activate` command in step #4. You do NOT need to reinstall matplotlib, however.)