Homework #6

Physics 129   Spring 2022

Problems due **Saturday, May 7, at 11:55 P.M.**

Please read the homework guidelines handout on the course web page.

Before attempting this assignment, ensure your RPi is connected to the Internet, then run the `update_physrpi` script.

Better answers and code will get better grades.

Reading

→ Complete by **Monday, May 9**

- Read chapter 16 in Shotts.

- Read section 6.4 in K&N.

Problems

1. **Project Guidelines.** Read the *Project Guidelines Handout* on the course web page. **Be sure to send your project description paragraph to Prof. Lipman before the due date specified in the handout.**

2. **Plot Trig Functions.** Write a program that plots $\sin(\theta)$ and $\cos(\theta)$ as functions of θ in two different colors. Show 2.5 complete periods. Label your axes, and include a title for your plot. Turn in your plot as an EPS file along with your program.

3. **Surface Plot.** Write a program using the `plot_surface` method from the `Axes3D` class to plot the function $z(x, y) = \sin(x)\cos(y)$. Show 2.5 periods on the x and y axes. Turn in your plot as an EPS file along with your program.

   Hint: http://matplotlib.org/3.3.4/tutorials/toolkits/mplot3d.html

4. **wget, grep, and sed.** Write a shell script that uses the `wget`, `grep`, and `sed` commands to print out for the user when the Physics 129 web page announcements were last updated. Include a detailed description of how your `sed` command works.

   Big Hints: If you retrieve the top-level HTML file from the course web page and extract the "Latest update" line, you can pipe it through a sed command that looks like this:
   `sed -e 's/^.*">//' -e 's/<.*$//'`
   If you choose the appropriate options for `wget` (RTFM), your script should not need to save any files to disk.

   Here is the URL for the Physics 129 web page:
   http://web.physics.ucsb.edu/~phys129/lipman/

5. **Get Web Page with socket.** Write a Python program that prints out for the user when the Physics 129 web page announcements were last updated. Retrieve the course web page by opening a raw socket to port 80 on the server.

   Hints: See the `client.py` example.
   Before reading the data, you must send an `http` command through the socket. It will look similar to this: `b'GET / HTTP/1.0\r\n\r\n'`

6. **Get Web Page with Requests.** Write a Python program that prints out for the user when the Physics 129 web page announcements were last updated. Retrieve the course web page using `requests`, and process the result using either string methods or `bs4`.

   Hints:
   If you decide to use `bs4`, you may need to import `re` and use a `BeautifulSoup` method to search for `text = re.compile('RE')`, where `'RE'` is a regular expression that matches the text you want to find.
   https://requests.readthedocs.io/en/master/
   https://www.crummy.com/software/BeautifulSoup/bs4/doc/#searching-the-tree

7. **Time Server.** Write a program that serves the current time in human-readable format when a connection is established to TCP port 55555 on your RPi.

   Hints: See the `server.py` example.
   Start the Python interpreter, then type:
   `import time`
   `help(time)`
   Use the space bar and `'b'` to page forward and back.