Homework #1

Physics 129 Spring 2022

Problems due **Saturday, April 2, 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, April 4**

- Read chapters 1–4 and chapter 12 in *The Linux Command Line* (Shotts)
- Read chapter 1 in *A Student's Guide to Python for Physical Modeling* (K&N)

Problems

1. **Password Security.** For each of the following conditions, determine the number of possible passwords:

   a. 8 binary characters, each of which can be either 0 or 1

   b. 4 characters, each one having 16 possibilities

   c. 2 characters, 26 possibilities for each (a–z)

   d. 8 characters, each being one of a–z, A–Z, or 0–9

   e. 8 characters, each being one of 94 printable characters.

2. **Computation Time.** At 10^{11} guesses per second, how many days would it take to check all the possibilities for the last configuration in the previous problem?

3. **Password Security, part 2.** Having determined in the previous problem that his 8-character password is not sufficiently secure, a student increases its length to 12 characters, which he chooses at random from the 94 printable possibilities.

(a) At a rate of 10^{12} guesses per second, how many years would it take to try every possible password of this new length drawn from the 94-character set?

(b) For a passphrase using only lower and upper case letters and spaces, how many characters would it take to match the strength of the student's 12-character password?