

# Homework #3

Physics 129 Spring 2022

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Problems due **Saturday, April 16, at 11:55 p.m.**

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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.

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## Reading

→ Complete by **Monday, April 18**

- Read chapters 8–9, 17, and 32, and the material on the `read` command in chapter 28 in Shotts.
  - Read chapter 3 in K&N.
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## Problems

- 1. User Input.** Write a program that asks the user to enter a string, after which it prints the string 10 times. Print each instance of the string on a separate line.
- 2. Processor Temperature.** The temperature of the RPi CPU in millidegrees celsius can be found by reading this file: `/sys/class/thermal/thermal_zone0/temp`.
  - (a) Write a program that does the following:
    1. Use the `subprocess` module to read the temperature file by running `cat`.
    2. Convert the string returned by `cat` using `float()`, and divide to get degrees celsius.
    3. Print out the temperature once per second in an infinite loop.
  - (b) Write a second program that prints out a message repeatedly as fast as it can. Run this program at the same time as the first one in a separate terminal window. Record what happens to the processor temperature in your answer file. Kill the second program and record the effect on the processor temperature.

Hint: Study the `subproc_ls.py` example program in `$HOME/physrpi/python/` on your RPi.

- 3. Write File.** Write a program that creates a file containing two user-provided strings, one per line.

Hint: Study the `careful_write.py` example function in `$HOME/physrpi/python/` on your RPi. You may use this function in your program.

- 4. Read File and Average.** Write a program that reads numbers from a user-specified file and prints out their average. The file should contain one number per line.

Hint: Study the `file_readlines.py` example function in `$HOME/physrpi/python/` on your RPi. You may use this function in your program.

- 5. Finding Files.** Explain the function of the `dfr` alias that has been installed on your RPi. Make sure your explanation is complete.

- 6. Directory Checksum.** Write a complete line-by-line description of the function of the `ds` script that has been installed in `$HOME/physrpi/scripts/` on your RPi.

Hint: Read about shell functions in chapter 26 of Shotts, `if` in chapter 27, and `while` in chapter 29.

- 7. String Processing.** Write a program that

- a. Prompts the user for a string with at least 3 words
- b. Rejects the string and reprompts if the string has fewer than three words
- c. Prints the words in the string, one per line
- d. Prints the first three characters of the string
- e. Prints the last three characters of the string (not counting the newline character)
- f. Prints the first half of the string (include any characters on the boundary)
- g. Prints the last half of the string (include any characters on the boundary)
- h. Prints the string with the words in reverse order
- i. Prints the string with the words alphabetized
- j. Prints each character in the string, one per line
- k. Prints hexadecimal values for each character in the string, one line per character  
[Hint: read about the `ord()` function.]

**8. Valentine's Day.** Gradeschool students are often required to produce Valentine's Day cards for each of their classmates, even the ones they don't like. This repetitive, soulless task is a perfect candidate for computer automation. Use the file `classlist.csv` from `$HOME/physrpi/coursefiles/` and write a program that

- a. Reads in the class list file.
- b. Prints out messages wishing each student a happy Valentine's Day. The messages should be formatted like this:

Happy Valentine's Day, Enrico Fermi!

The names must be properly capitalized, with remaining letters in lower case.