UCF Physics PHZ 3150: Introduction to Numerical Computing
Fall 2021 Homework 7

Due October 14

Goals: Become familiar with Python, dictionaries, FOR and IF loops and reading in data.

Reading: ThinkPython 5, 7, 11

Problems to Hand In: For this assignment, your log is part of your homework. In one of the entries, it should identify the start and end of `HW7` and list the problem numbers in order. Keep notes about what you are doing for each exercise/problem, as well as the answers to the problems. If you made a `HW7` entry in your log in a prior session and want to change it, just copy it to the current (last) session, and edit there. We will grade the last entryonly. All text related to one assignment should be in one entry, with the problems done in order.

Problem 1 (**5 points**). Make a new folder named `hw7_<yourname>` under you `handin` folder. For this homework your main homework file is a Python file named `hw7_<username>.ipynb`. Save it inyour homework folder. Remember to commit your filesand push to GitHub (also, great backup!). Your name, assignment number, and the date should appear as comments at the top ofthe notebook. At the start of every problem write the problem number using markdown comments. Any remarks or written answers you may make should also be written with markdown. If you need to comment something in the code (for coding clarity) do so with a normal comment (i.e., # this is a comment). Print the problem number (as in "Problem 1:") before each problem's output. Use the print() function to print, don't just type the expression. Start your notebook by importing numpy.

Problem 2 (**15 points**). Create a function `word_to_number` that takes as input an English word that corresponds to a number from 0 to 20 ('zero', 'one', 'two' etc) and returns the corresponding number (0, 1, etc). Inside the function create a dictionary that maps every appropriate English word to the corresponding number (so 1 will be mapped to 'one'). The keys should be your words and the values the number. Remember to write an appropriate docstring for your function! In the main program call the function for: 'three', 'seven', 'twelve', 'sixteen'and 'nineteen'and print an informative statements with your results (e.g., " 'three' is 3").

Problem 3 (**10 points**). `FOR` loops automatically iterate over a parameter `i` (unlike `WHILE` loops). They start from `i=0` (or whichever value you ask), do what you want them to do and then go to the next step `i = i+1` (`i+=1`). Writing an extra `i = i+1` can create accidental bugs in `FOR` loops, and missing a `i = i+1` can make your `WHILE` loops run an infinite time.

Make a code that splits the sentence: "Deleting an item from a list or array while iterating over it is a Python problem that is well known to any experienced software developer" in the words it's made of. Then use a `FOR` loop to loop over the full sentence, and print -at the end -only the *longest* word of the sentence. Do the same program, but now looping over the sentence with a `WHILE` loop.

Problem 4 (**10 points**). Create an array `x` that goes from 100 to 1,000 in steps of 25. Create an array `y` that is equal in size to `x` but full of zeros. Create a `FOR` loop that scans through `y` and assigns `y[i]` a value equal to `x[i]/2 IF i` is an even number, or `x[i]**2 IF i` is an odd number.

Problem 5. (**15 points**) Get file `'student_data.csv'` from the homework folder in Webcourses. The file contains a 10 by 10 table: column 0 is the ID of the student (20191 to 201910), columns 1 to 5 are the grade the student got for each homework assignment, columns 6 to 8 are the grades they got for quizzes and column 9 the grade they got for the final exam. Read the data into a list or numpy array named `all_grades`.

Make a function `pass_or_no_pass(grades)` that gets as input the `all_grades` and calculates the final grade of a student. To do this you need to take into account that their final grade is calculated with: 60% the final exam grade, 15% the quizzes grade and 25% the homework grade. The function should return a tuple with: the student ID, their final grade in a scale of 0-100% and a 'pass' (if grade is > 60%) or 'no pass' (if grade is < 60%) (so, e.g., (21115, 75, 'pass')) . Call the function for all students and print your results. Remember that the function should include an informative docstring!

Problem 6 (**10 points**). Prepare and submit your homework. Copy the finalized Jupyter notebook to the `handin/hw7_*` folder and don't forget to commit and push it to GitHub. Explain what you did to do that in your log. Make a screenshot that shows you committed the file and add it to your `handin/hw7_*` folder (remember to use an appropriate name for the screenshot!). Write what you did to make and submit the zip file into your log. When satisfied, close the log, copy it to your homework directory one last time, and run the commands to make and submit the zip file. Turn the file in on WebCourses.