homework1

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Introduction to Computer Programming for the Physical Sciences

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Open a new Jupyter notebook

Name your notebook with your name and Homework 1

Open a Markdown cell at the top and write your name and Homework 1

Open a Markdown cell before each problem and write e.g. Problem 1, Problem 2(a), etc.

Please abide by the Policy and Guidelines on Using AI Tools

Once you finish the problems: 1) Restart the Python kernel and clear all cell outputs. 2) Rerun the notebook from start to finish so that all answers/outputs show up. 3) Save your notebook as a single .pdf file and upload it to Gradescope on Canvas by the deadline. No late homeworks will be accepted except for illness accompanied by a doctor's note.

For parts of problems that require analytical solutions you can perform your calculations using a pencil and paper. Then photograph your work and convert the photograph to a .pdf file using an online tool. Homework assignments can only be submitted as a single .pdf file, so you will also need to figure out how to concatenate your photo .pdf file and your notebook .pdf file into a single .pdf file that you can submit. Online websites can do this for you. Alternatively, you can code up the analytical solution to your problems in a notebook Markdown cell using the LaTeX mathematical rendering language. This is harder but a chatbot can help you learn it.

1 Homework 1

1.1 Problem 1

Write a program that takes a sentence and prints out a count of the number of words and the number of characters in the sentence. Note that words can be separated by white spaces but also punctuation (commas, semicolon, etc.), so your program should deal with that. For example `hello world` and `hello, world` and `hello,world` all consists of two words. Soon we will learn how to make such a program into a function. For now, test your code on this sentence:

"When half way through the journey of our life I found that I was in a gloomy wood, because the path which led aright was lost. And ah, how hard it is to say just what this wild and rough and stubborn woodland was, the very thought of which renews my fear!"

```
[ ]:  # Your solution here please
```

1.2 Problem 2

Write a program that prints to the screen the set of integers between 100 and 400 (inclusive) for which all of the *digits* are even.

```
[ ]:  # Your solution here please
```

1.3 Problem 3

Write a program that calculates the prime number factors of any number, with their relative powers. For example if the number was 4567956 it should return

2 to the power of 2
3 to the power of 1
191 to the power 1
1993 to the power 1

Check your program by running it on test cases for which you know the answer (e.g. prime numbers). Calculate the prime factors for the number 9572121. If you want to further test your code you can run it on sample numbers using a website like https://www.calculatorsoup.com/calculators/math/prime-factors.php.

```
[ ]:  # Your solution here please
```