CSCI 2033: Elementary Computational Linear Algebra
Assignment 1

Notation   Scalars are small letters (e.g., $a, b, \lambda, \alpha, \beta$), vectors are boldface small letters (e.g., $\boldsymbol{v}, \boldsymbol{w}$), and matrices are boldface capital letters (e.g., $\boldsymbol{A}, \boldsymbol{B}$). Vectors by default are column vectors; they are matrices with single columns. Row vectors are matrices with single rows.

Instruction

- This homework set totals 4 points.

- Problems 0–2 are designed to familiarize you with google colab and the submission process for this class.

- Please show all your work in the Colab file (**.ipynb**) we release with this homework. **Do not modify any provided code and only write your code in regions marked "YOUR CODE STARTS HERE"**. In your final submission, submit the files on Gradescope.

- Make sure that your file naming has the following convention

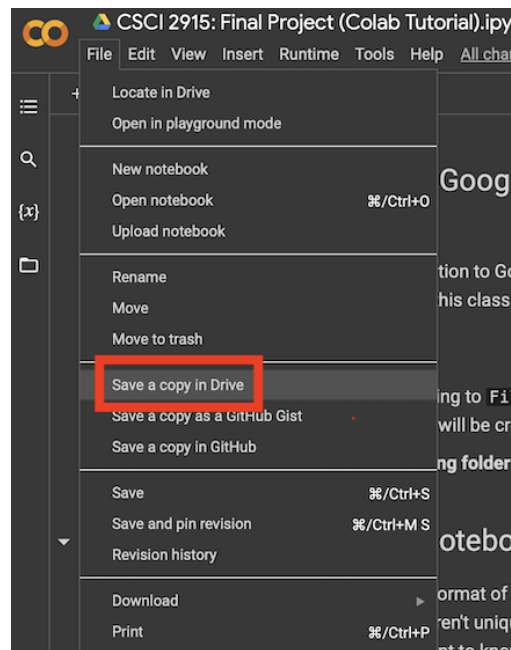 *<your x500>Homework<HW number>.ipynb*

Problem 0 NumPy Tutorial

You will need to work through the `Prob0_Numpy_Tutorial` file to master the background necessary to proceed. We will point you to additional tutorial materials as we move on; they are mostly linked from the clickable words and phrases that are **in blue**.

Problem 1 Learning to work with Jupyter Notebooks (2 points)

The purpose of this homework is to get you familiar with Jupyter Notebooks and how to submit the homework assignments for this class. The first thing you need to do when starting the assignment is make a copy of it and save it to your university google drive. You can do this by clicking `File -> Save a copy in Drive` in the top menu bar. You can find the copy in a folder titled Colab Notebooks within your Drive (which will be created for you if you don't have one already).

1.1 (1/2) Text Cells In Jupyter Notebooks, we can add text cells or code cells. Text cells are used to make the notebook clear and easy to read. It is very useful in creating workbooks like the ones we will use in the course. To edit a text cell, double click on it and you will be able to write on it.

In the text cell part of the notebook, write down what you are looking forward to learning in CSCI 2033 this semester. A picture of the cell is found below.

1.2 (1/2) Code Cells This is where you will be doing most of the writing for the semester. To write on a code cell, you just need to click on it once and write the code. You can run a code cell by clicking the play button on the top left of the cell, or by pressing `Shift + Enter` while you have that cell selected.

For this problem, you need to go to the numpy tutorial in **Problem 0** and find out how to create a 2 by 2 numpy array. You may choose whatever entries you want in there, so long as they are not all zeros. After you created your array, print it in the same cell.

1.3 (0/2) The Jupyter Environment Since Jupyter Notebooks have many different cells, that are independent of each other, it has an undelying environment that keeps track of all variables, functions, classes, etc that were created in any cell. This means that you can create a variable in one cell and then use it or change it in a different cell!

1.3 (0/2) Running Cells in Order Jupyter Notebooks can be tricky to deal with since you may run the cells in any order you'd like. This is different from a standard python file that runs the a line of code at a time from top to bottom. This means we always need to be careful to not run things in the wrong order. In the Notebook for this homework, you can play with the order of cells run a bit and see how it affects the variables.

1.4 (0/2) Adding, Removing and Moving Cells   You add a cell to a notebook by clicking on the `+ Code` or `+ Text` buttons at the top left of the screen underneath the top menu bar. Keep in mind that the inserted cells will be placed right after the cell you have selected (or the very bottom if you have none selected), so make sure you know where you want your cell to be.

Alternatively, if you hover underneath the cell you want to insert under, the `+ Code` and `+ Text` buttons will automatically appear.
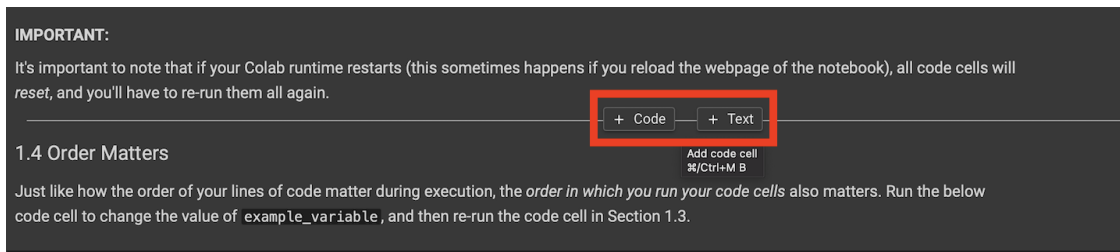
To delete cells, press the trash bin icon after selecting the cell you want to delete.
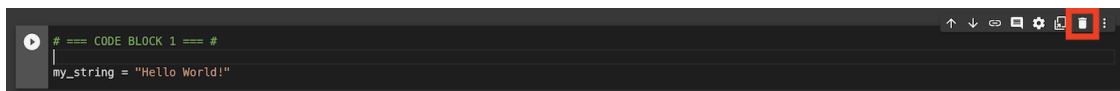
Problem 2 Google Colab (0 points)

2.1 (0/2) Libraries   Google colab has a lot of useful libraries installed in it. We will mostly use the numpy and matplotlib libraries in this course. Look at the cells in this section to see how they can be used. We will get a lot of practice with them throughout the semester.

Problem 3 Downloading the Notebook and Submitting it to Gradescope (2 points)

Once you have finished your notebook, make sure to change the name of the file to the following format
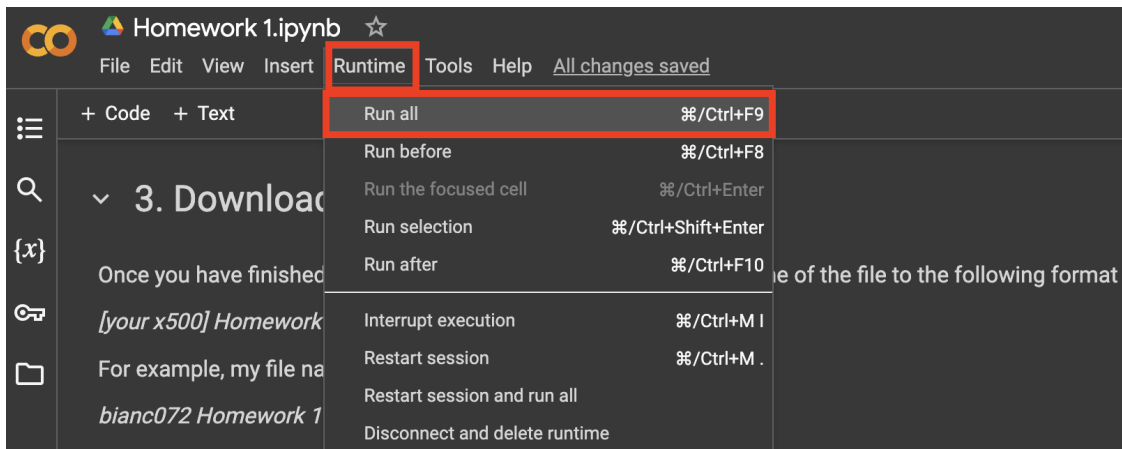
<p align="center"><i><your x500>Homework<HW number>.ipynb</i></p>

For example, my file name yould be

<p align="center"><i>bianc072Homework1.ipynb</i></p>

Make sure to follow this format to all homeworks from now on.

After you're done changing the file name, make sure that you re-run all the files and that no errors occur.

Now, you can download it as a Python notebook (.ipynb) file. To do this, go to `File -> Download` from the top menu bar, and select the download format for the notebook. Make sure to download it as a Python notebook and not as a regular Python file! The process for that is outlined below!