CS 5600/6600
Spring 2024
Assignment 0 – Python Fundamentals
Due: 06/04/2025 11:59 pm

Guidelines:

The goal of this assignment is to provide a refresher with python programming and the associated libraries that we will be using in this course such as NumPy and Matlplotlib. **There will be three parts (each worth 5 points) to this assignment, for a total of 15 points.**

Please submit your code as a IPython notebook on Canvas. Please use Google Colab to create and test your code as it will be graded on Colab to ensure a common, fair platform for everybody. Do not submit your output files. We will generate them when we run your code.

Problem 1

In this part of the assignment, Numpy arrays. Create a 1D NumPy array of shape [1x5] with random values drawn from a uniform distribution. Perform the following operations:

- Compute the mean and standard deviation of the array.
- Reshape the array into a 2D array with 5 rows and 1 column.
- Add 5 to each element in the array and print the result.
- Compute the dot product of this reshaped array with itself.

After each step, print the resulting value.

Problem 2

In this part of the assignment, you will be working with visualizing plots with Matplotlib. Generate a set of x values ranging from 0 to 100 with an increment of 0.1 using NumPy. Compute the corresponding y values using the function y=sin(x). Plot the sine wave using Matplotlib, and add appropriate labels for the x-axis, y-axis, and a title for the plot. Save the plot as a PNG file named “sine_wave.png”.

Problem 3

In this part of the assignment, you will be integrating NumPy and Matplotlib to analyze and visualize data. Perform the following steps:

- Create two NumPy arrays: one for x values ranging from 0 to 100 with an increment of 1, and another for y values that represent a quadratic function $y=0.5x^2 +2x+1$.
- Plot the quadratic function using Matplotlib with appropriate labels and a legend.
- Add gridlines to the plot and display it with a line style of your choice.
- Save the plot as a PDF file named quadratic_function.pdf.