Homework 4

Ch En 263 – Numerical Tools

Due: 05 Feb. 2024

Instructions

- Complete the problems below and submit the following files to Learning Suite:
 - Handwritten portion: scan each page (or take a picture) and combine them into a single pdf named: LastName_FirstName_HW4.pdf
 - Excel portion: submit a workbook named LastName_FirstName_HW4.xlsx where each worksheet tab is named "Problem_1", "Problem_2", etc.
 - Python portion: submit a separate file for each problem named LastName_FirstName_ HW4_ProblemXX.py where XX is the problem number.

Problems

- 1. Do the following in a Python file.
 - (a) Use loops to create a 2D numpy array to store the values in this 10×10 matrix:

Γ2	-5	4	-1	0	0	0	0	0	0 -
0	2	-5	4	-1	0	0	0	0	0
0	0	2	-5	4	-1	0	0	0	0
0	0	0	2	-5	4	-1	0	0	0
0	0	0	0	2	-5	4	-1	0	0
0	0	0	0	0	2	-5	4	-1	0
0	0	0	0	0	0	2	-5	4	-1
0	0	0	0	0	0	0	2	-5	4
0	0	0	0	0	0	0	0	2	-5
0	0	0	0	0	0	0	0	0	2 _

Print the array to the console. *Hint: The main diagonal is where the row number equals the column number.*

- (b) Use slicing to assign the 3rd row of the matrix to the variable \boldsymbol{x} . Square each element in \boldsymbol{x} and print thier values to the console.
- 2. Do the following in a Python file.
 - (a) Write a function called doubledot(A, B) that takes two matrices (2D numpy arrays) as arguments and returns a value using the following formula:

$$oldsymbol{A}:oldsymbol{B}=\sum_{i}\sum_{j}A_{ij}B_{ij}$$

where A and B are $N \times N$ matrices. *Hint: This is called a double-dot product. It is like a dot product for matrices. It should give you a single number.*

(b) Download the files A.dat and B.dat from the course website. Read your files into Python and execute your function on A and B. Print the resulting number.