Advanced Topics in Numerical Analysis: High Performance Computing Assignment 4 (due Apr. 18, 2022)

Handing in your homework: Hand in your homework as for the previous homework assignments (git repo with Makefile), answering the questions by adding a text or a LaTeX file to your repo.

1. **Matrix-vector operations on a GPU.** Write CUDA code for an inner product between two given (long) vectors on a GPU. Then, generalize this code to implement a matrix-vector multiplication (no blocking needed here) on the GPU. Check the correctness of your implementation by performing the same computation on the CPU and compare them. Report the memory band your code obtains on different GPUs.[1]

2. **2D Jacobi method on a GPU.** Implement the 2D Jacobi method as discussed in the 2nd homework assignment using CUDA. Check the correctness of your implementation by performing the same computation on the CPU and compare them.

3. **Update on final projection** Describe with a few sentences the status of your final project: What tasks that you formulated in the proposal have you worked on? Did you run into unforeseen issues?

[1] The cuda{1–5}.cims.nyu.edu compute servers at the Institute have different Nvidia GPUs, for an overview see the list of compute servers available at the Institute: https://cims.nyu.edu/webapps/content/systems/resources/computeservers.