

EECS 739: Homework 1

Due: Wednesday, February 13, 2019 (at 3pm)

Reminder: Please review the homework policies on the syllabus before working on the assignment.

Questions:

1. (20 points) Do Problem 3.2 in Grama *et al.*
2. (20 points) Do Problems 3.7, 3.8, and 3.9 in Grama *et al.*
3. (20 points) Consider the multiplication of two $n \times n$ dense matrices A and B with $A \times B = C$. Show how to parallelize matrix-matrix multiplication when A is partitioned among p processors laid out in a logical square 2D mesh in the following formats:
 - (a) 1D rowwise block cyclic partitioning
 - (b) 2D block cyclic partitioning.

To answer this question, for each partition, draw a diagram illustrating the partitions of A and B . Then give a detailed pseudocode for the algorithm. Repeat for the second partition.

4. (20 points) Specify pseudocode for two parallel Gaussian Elimination algorithms. For this question, you should consider two different permutations of the i, j , and k indices for the triple loop. (See p. 468 in Karniadakis and Kirby for the pseudocodes for each of the six different serial algorithms.)