HW3

Problem 1)

4.2-1

Use Strassen's algorithm to compute the matrix product

$$\begin{pmatrix} 1 & 3 \\ 7 & 5 \end{pmatrix}\begin{pmatrix} 6 & 8 \\ 4 & 2 \end{pmatrix}.$$

Show your work.

4.2-2

Write pseudocode for Strassen's algorithm.

Problem 2:

Provide a most efficient divide-and-conquer algorithm for determining the smallest and second smallest values in a given unordered set of numbers. Provide a recurrence equation expressing the time complexity of the algorithm, and derive its exact solution in the number of comparisons. For simplicity, you may assume the size of the problem to be an exact power of a the number 2

Problem 3

Suppose that instead of always selecting the first activity to finish, we instead select the last activity to start that is compatible with all previously selected activities. Describe how this approach is a greedy algorithm, and prove that it yields an optimal solution.

Problem 4 - This one is tricky. Enjoy doing it, but don'ts spend to much time on it.

Not just any greedy approach to the activity-selection problem produces a maximum-size set of mutually compatible activities. Give an example to show that the approach of selecting the activity of least duration from among those that are compatible with previously selected activities does not work. Do the same for the approaches of always selecting the compatible activity that overlaps the fewest other remaining activities and always selecting the compatible remaining activity with the earliest start time.