2/5/09

Programming Project 1
Due **3/5/09** before class

Matrix Multiplication (30 points)

Implement three types of algorithms for multiplying two $n \times n$ matrices. **Assume n is a power of** 2.:

1. The straight-forward $\Theta(n^3)$ matrix multiplication algorithm.

2. Strassen's matrix multiplication algorithm.

3. A mixture of both algorithms that is based on Strassen's algorithm: Assume some parameter a is given. For all recursive calls of Strassen's algorithm in which $n > a$ use the regular recursion by Strassen. If $n \leq a$, use the straight-forward $\Theta(n^3)$ algorithm (i.e., this is the "base case" of this algorithm).

Evaluate your different algorithms, and write a short report (word document or ASCII text file). This evaluation will be worth 10 points. For this, create test matrices for different values of n (you can generate matrices with random numbers, for example), and record the runtimes of your three algorithms. For the third algorithm also vary the parameter a. The range for n should reach at least $n = 1000$ and a should reach at least $a = 50$. Your report should include the runtimes and should include a conclusion as to which algorithm performs best.

Turnin instructions

- You have to work on this programming project on your own. Group submissions are not allowed.

- You can use Java, C, or C++ for this project. If you want to use a different programming language, check with our TA first.

- Zip up a directory with your entire project (source code and report). Turn in the zip file by emailing it to me (carola@cs.utsa.edu) with the subject "CS3343 project 1 submission".

- All projects need to compile. If your program does not compile you will receive 0 points on this project.

- Do not use any fancy libraries. We should be able to compile it under standard installs of Java, C, or C++ under linux and/or windows. You may want to include some comments how you compiled the project.