



CSD2181/CSD2183

Data Structures

Please write clearly:

Name: Bryan Ang Wei Ze

Student ID: 2301397

Homework 1, Exercise 1.3 – Trimester 2, AY2024/25

Instructions to students:

Your answers must fit within the designated boxes. Do not resize them. Gradescope requires your answers to be placed precisely in these locations.

(a) Insert your measured running times in the following format:

dimension	log(dimension)	log(basic_ms)	log(strassen_ms)
8	2.07944	-0.254247	-0.191652
16	2.77259	1.84228	1.8106
32	3.46574	3.88877	3.70046
64	4.15888	5.96018	5.62782
128	4.85203	8.03849	7.57597
256	5.54518	10.1914	9.58275

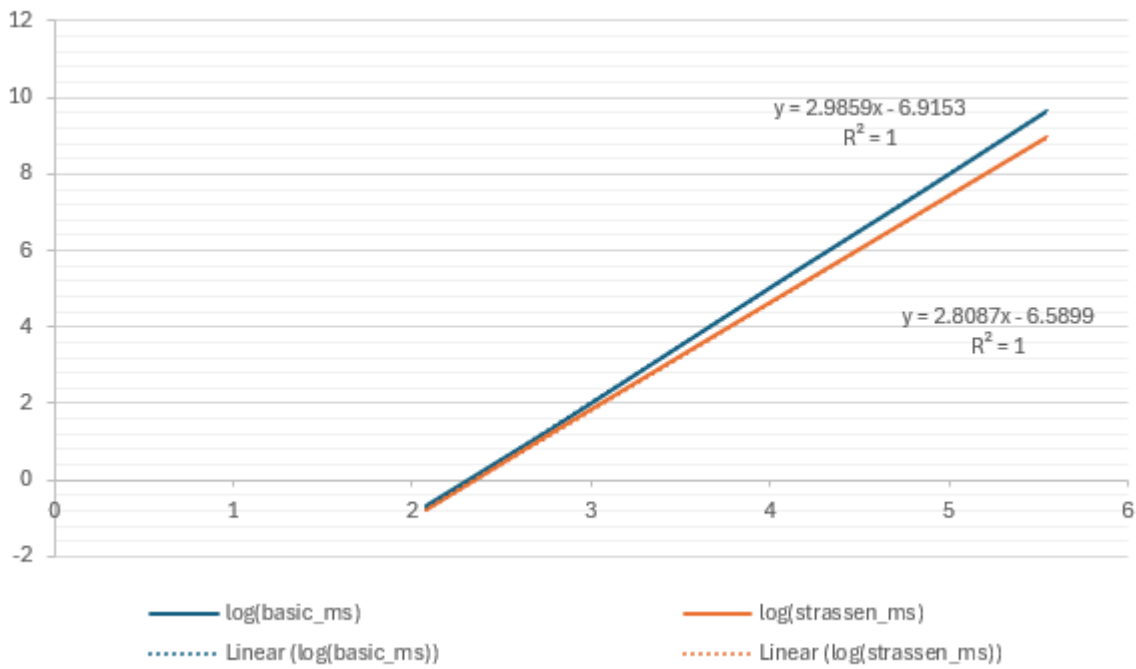
(5 points)

dimension	log(dimension)	log(basic_ms)	log(strassen_ms)
8	2.07944	-0.668272	-0.750644
16	2.77259	1.3371	1.20595
32	3.46574	3.41157	3.13399
64	4.15888	5.49105	5.09046
128	4.85203	7.5736	7.04316
256	5.54518	9.66145	8.98371

- (b) Insert a diagram displaying your running-time measurements. Include one curve for basic divide-and-conquer matrix multiplication and another for Strassen's algorithm. Place $\log(T)$ on the y-axis and $\log(n)$ on the x-axis.

(5 points)

Log-Log Chart of growth functions



(c) Assume that the running times obey these equations:

$$\log T_1(n) = a_1 \log n + b_1$$

$$\log T_2(n) = a_2 \log n + b_2$$

Perform linear regression on the data you presented in parts (a) and (b) to estimate b . Enter your numerical estimates for b_{basic} and b_{Strassen} in the box below.

(10 points)

$$b_{\text{basic}} = 2.9859$$

$$b_{\text{Strassen}} = 2.8087$$

(d) Comment on your plot.

(5 points)

As the matrix dimension increases, the difference between the running times of both algorithms increases.

---END OF EXERCISE 1.3---