

**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

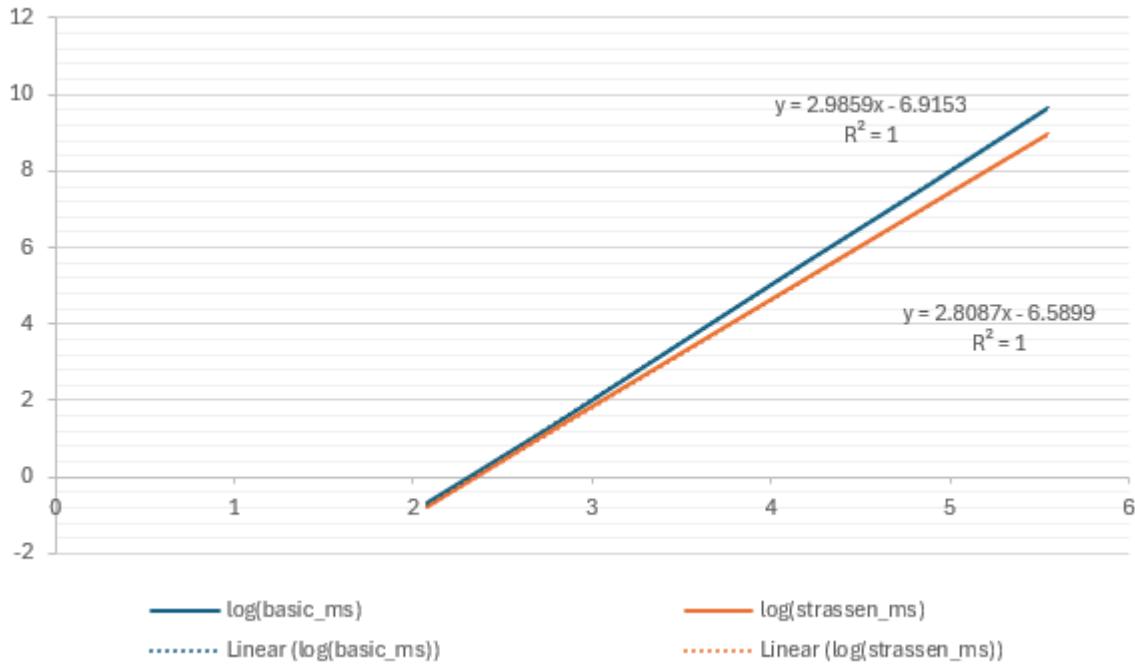
(5 points)

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:

$$\log T_1 = a_1 \log n + b_1,$$

$$\log T_2 = a_2 \log n + b_2.$$

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---