CS3310
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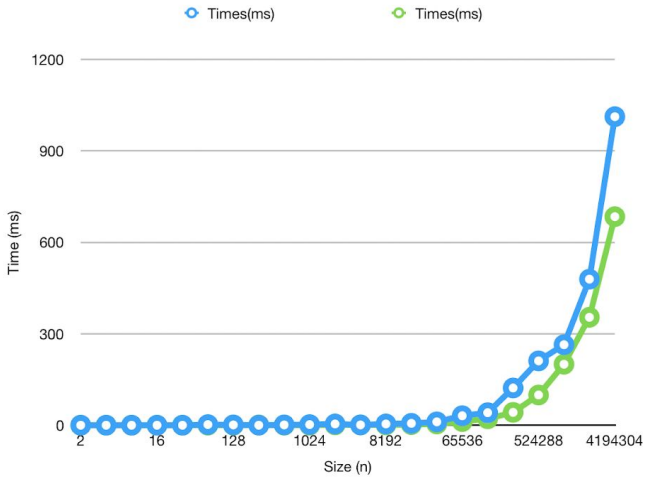
Project 1 Report

1. Mergesort and Quicksort
    a. The time complexity for Mergesort is O(n log n).
    b. The time complexity for Quicksort is O(n log n).
    c. The data below is not accurate since I only ran each sort once with a randomized array. Therefore there is not enough data to get the most accurate time average.

sort

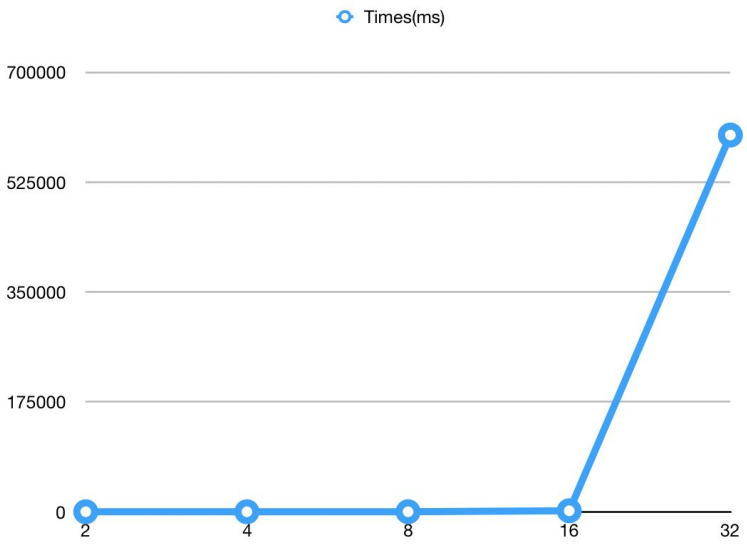
Size(n)	2	4	8	16	32	64	128	256	512	1024	2048	4096	8192	16384	32768	65536	131072	262144	524288	1048576	2097152	4194304
Times(ms)	0	0	0	0	0	2	1	0	1	2	4	1	4	6	11	31	41	122	211	264	479	1012
Size(n)	2	4	8	16	32	64	128	256	512	1024	2048	4096	8192	16384	32768	65536	131072	262144	524288	1048576	2097152	4194304
Times(ms)	0	0	0	0	0	0	0	1	0	0	1	1	1	2	4	12	21	42	99	200	354	684



2. Hanoi Tower
    a. The recurrence relation is T(n) = 2 T(n -1) + 1.
    b. The closed form solution is 2^(n+1) - 1.
    c. TIme complexity is (2^n).

Hanoi

Size(n)	2	4	8	16	32
Times(ms)	0	0	14	1583	600052



3. Matrix Multiplication
    a. Classical Matrix Multiplication
        i. Time complexity: O(n^3))
    b. Strassen's Matrix Multiplication
        i. Time complexity: O(n^log2(7))

matrix

Size(n)	2	4	8	16	32	64	128	256	512	1024	2048	4096
Times(ms)	1	0	1	0	3	13	103	709	5981	82072	516933	600005
Size(n)	2	4	8	16	32	64	128	256	512	1024	2048	
Times(ms)	0	0	1	5	21	470	934	5954	39909	290305	600099