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COT 4400

Project 12

Summary

The problem is to compare the efficiency of two algorithms that compute the GCD.

The first algorithm is Euclid's GCD algorithm. The algorithm runs in polynomial time.

The second algorithm is to use trial division to compute the GCD. The algorithm is runs exponential time. In my experiment I used values from 3.2 x 10^6 to 9.2 x 10^18.

Euclid's algorithm max time was one millisecond. The other algorithm max time was 49391 milliseconds. Here is a table of my inputs and run times.

Inputs	Input2	Euclid (Time) ms	Trial Division (Time) ms
92758000	3209000	0	6
53741000	59558000	0	2
62453000	87500000	0	2
87047547000	9721139000	0	21
972794674	161205721	0	7
838148993	537043606	0	7
639032372	51399666	0	6
8.5645E+16	1.68626E+17	1	7853
3.64085E+17	3.01884E+17	1	11877
8.29678E+17	1.60187E+16	1	12915
8.09938E+17	5.12476E+17	1	16710
2147483647	569874320	0	9
295285473	321243944	1	18
2.95285E+17	5.16615E+17	0	14554
8.05792E+18	3.24181E+18	1	49391
4.01461E+18	4.22954E+18	1	43113
9.2222E+18	9.70163E+17	1	46608

Euclid's algorithm is definitely much faster than using the other algorithm. Looking at the table above there wasn’t much of a difference in time until the numbers got bigger or I was always getting the best case.