Assignment 3

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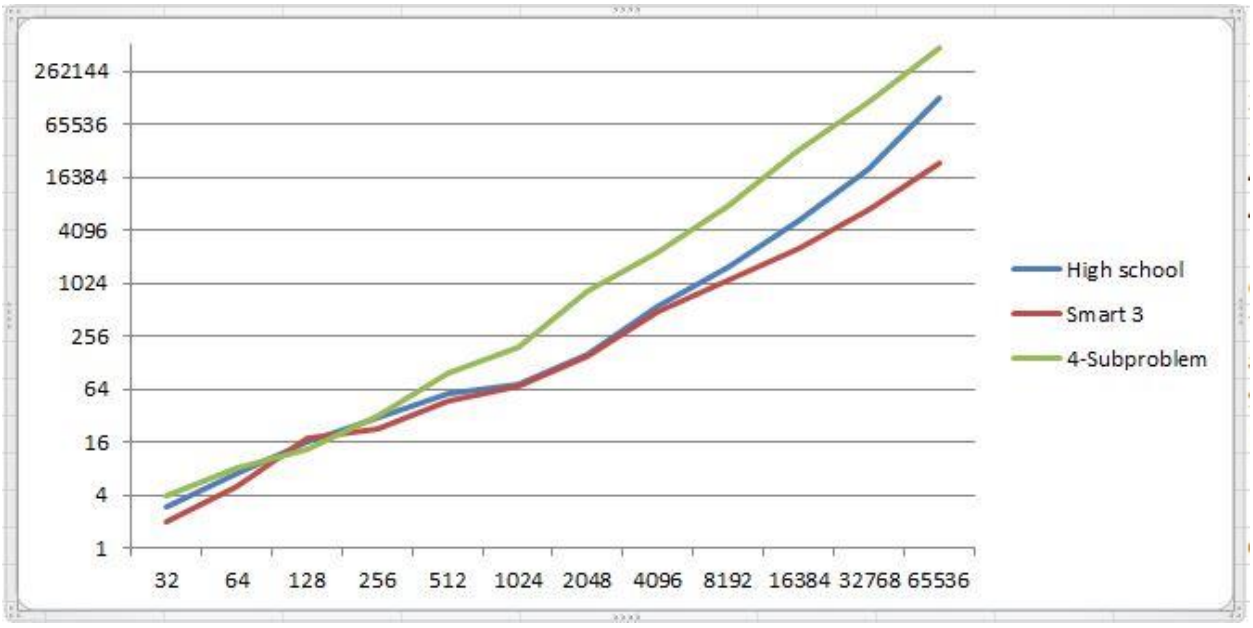
Polynomial multiplication:

We implemented three algorithms to achieve the output: 1) High school algorithm 2) Smart Three algorithm and 3) Three sub problem algorithm.

The runtimes for the algorithms are as follows:

n	High school	Smart 3	Recursion-2
32	3	2	4
64	7	5	8
128	16	18	13
256	30	23	32
512	58	47	95
1024	74	69	193
2048	159	149	823
4096	563	477	2340
8192	1592	1113	7917
16384	5152	2517	32552
32768	20101	7165	119819
65536	128146	23348	484467

Graph for the values:



High school algorithm:

This algorithm has a slope of 2.015 as per the output values. This algorithm produces moderate results and the runtime is directly proportional to problem size.

Smart 3 algorithm:

This algorithm is the most efficient algorithm as per the output values. It produces the outputs with very good time complexity. It produces the best results from all the 3 algorithms. The slope of this algorithm is 0.42.

Four sub problem algorithm:

This algorithm maintains a slope of 1.15. It does not give a good performance and takes high time compared to the other algorithms.

Comparison:

High school algorithm and Smart three algorithm gave good results initially whereas for higher input values, smart three algorithm was giving the best results. Four sub problem algorithm was not in the race for any kind of input size and proved itself to be not a good performer.