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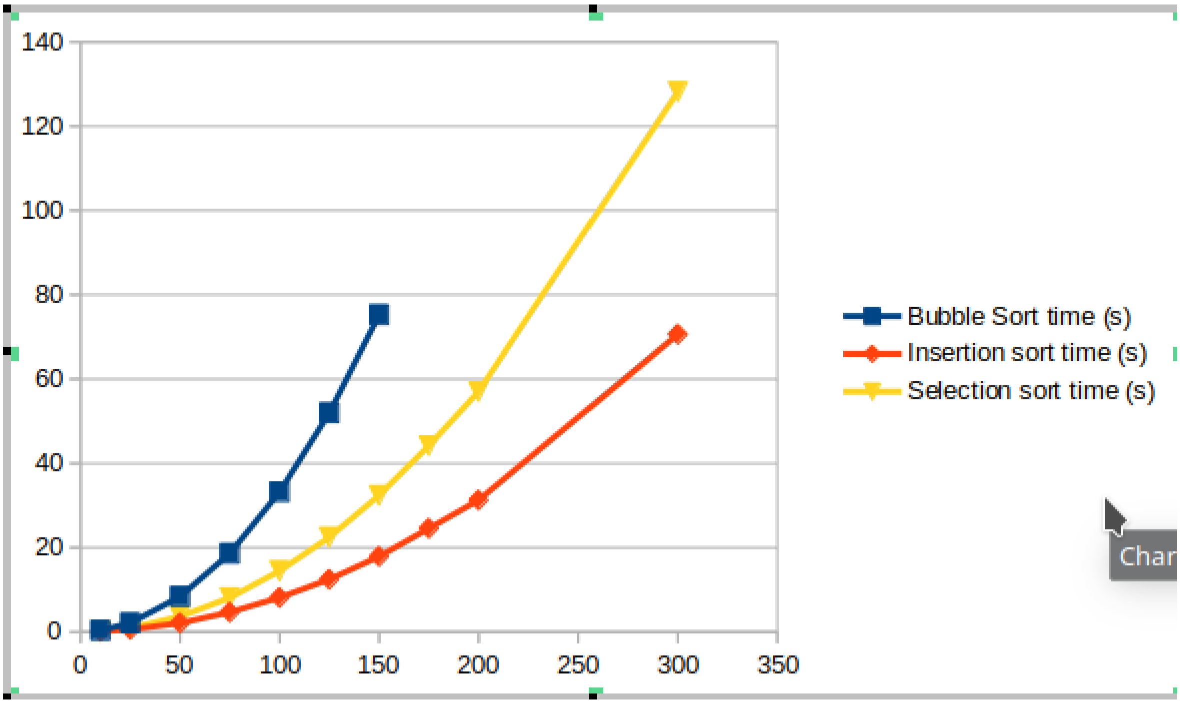
Array Size (in thousands)	Bubble Sort time (s)	Insertion sort time (s)	Selection sort time (s)
10	0.348951	0.109023	0.188616
25	2.10859	0.581818	0.950661
50	8.39106	2.09179	3.65253
75	18.6292	4.66499	8.09621
100	33.2474	8.14649	14.4736
125	51.9961	12.4752	22.4505
150	75.2707	17.9014	32.3819
175		24.5653	44.1964
200		31.2829	57.032
300		70.6035	128.229

1a and 1b is in this table



This line chart is from LibreOffice Calc as done in step c

1d) From the time analysis, we can see that the insertion sort is consistently better and the bubble sort is the worst of the three methods as array sizes increase to very large numbers. The lines do not cross since their exe times differ so much in their runs. Bubble sort seems to be four times slower than insertion sort and roughly two times slower than the selection sort. Insertion sort and selection sort are both pretty similar in their run of array size 10,000.

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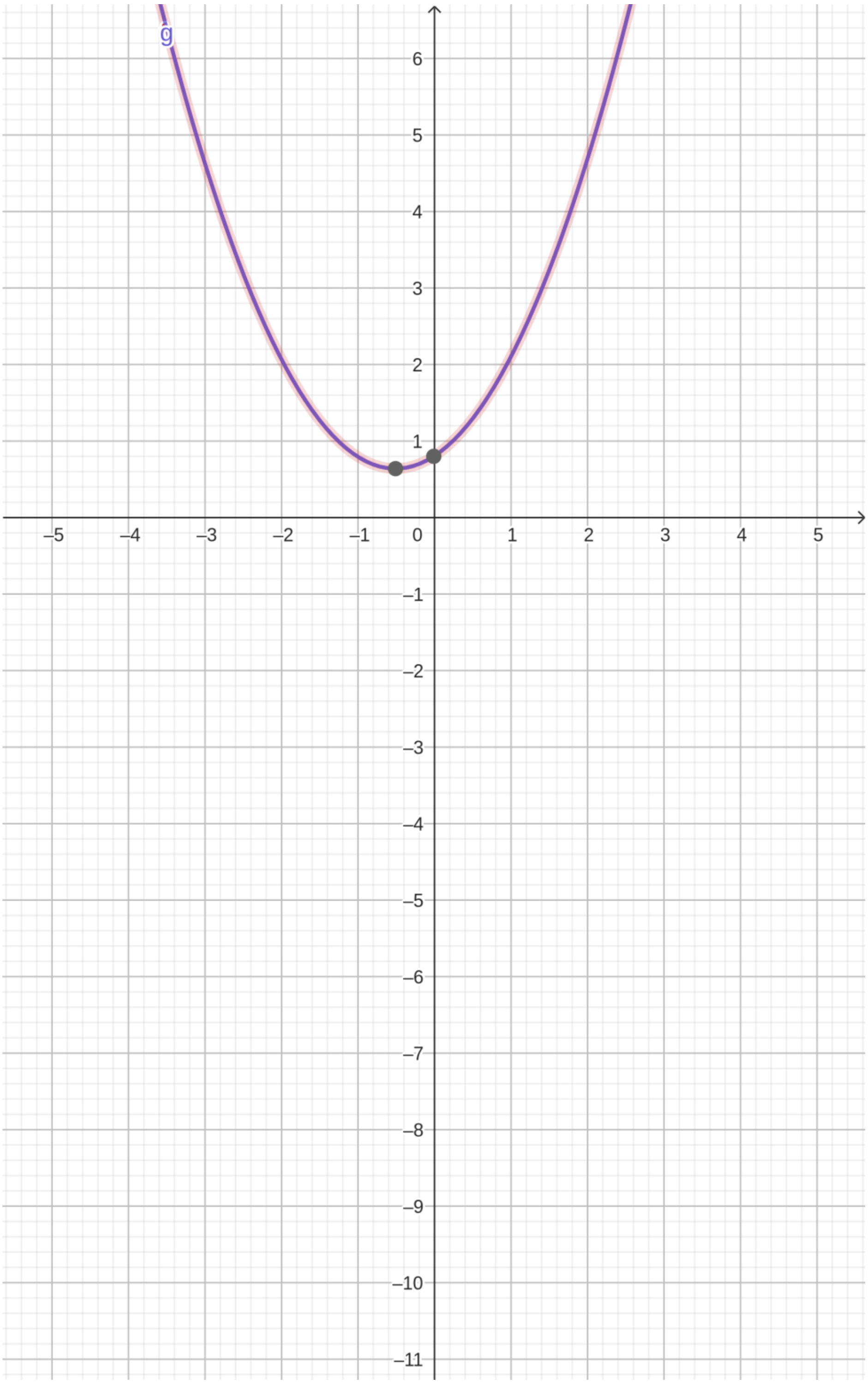
1e) EXAMPLE: g(x) = 0.6428571428571x^(2) + 0.6428571428571x + 0.8



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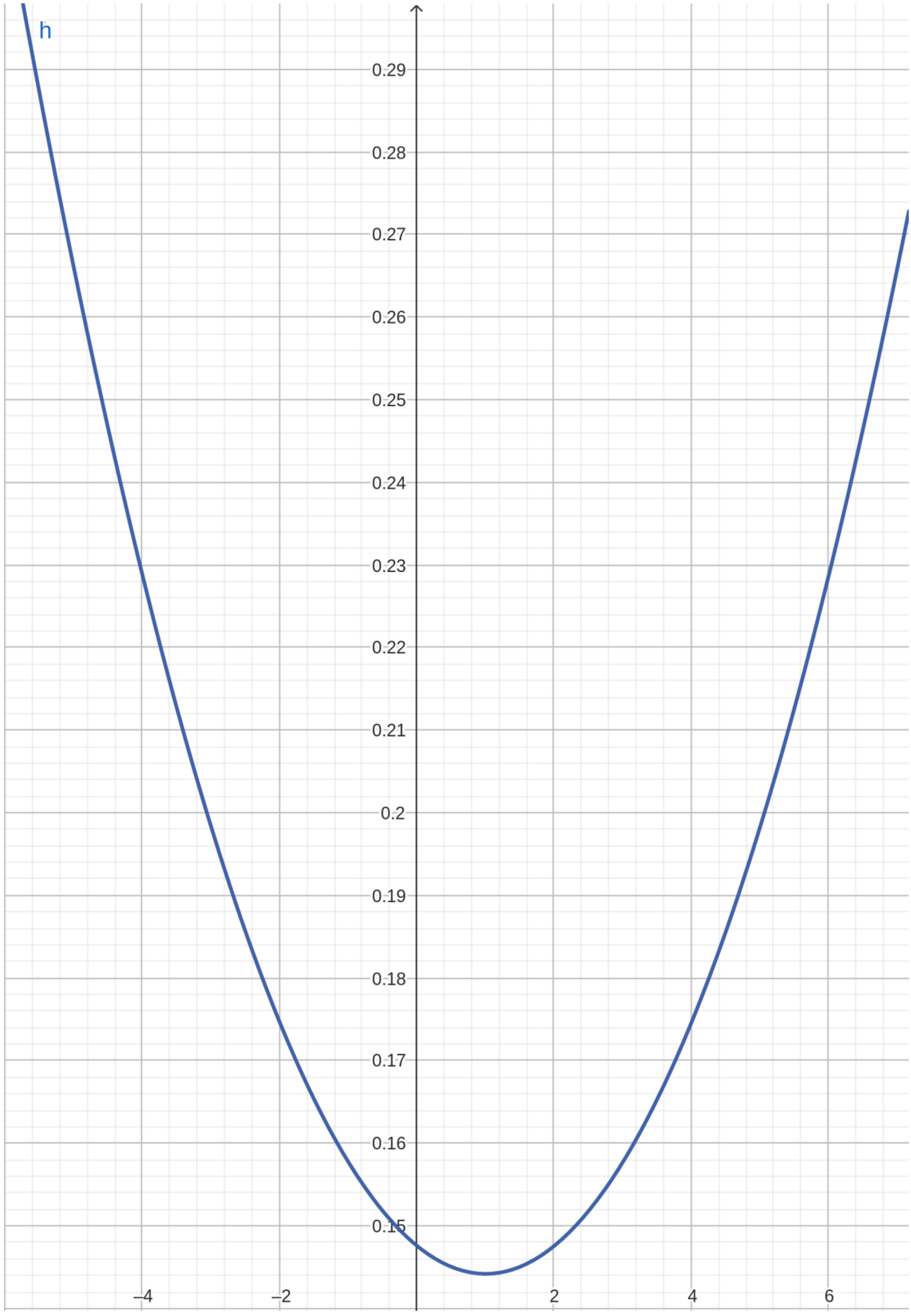
Equation and fit line for bubble sort:
h(x)=0.0033803769201 x^(2)-0.0068004993026 x+0.1476133007232



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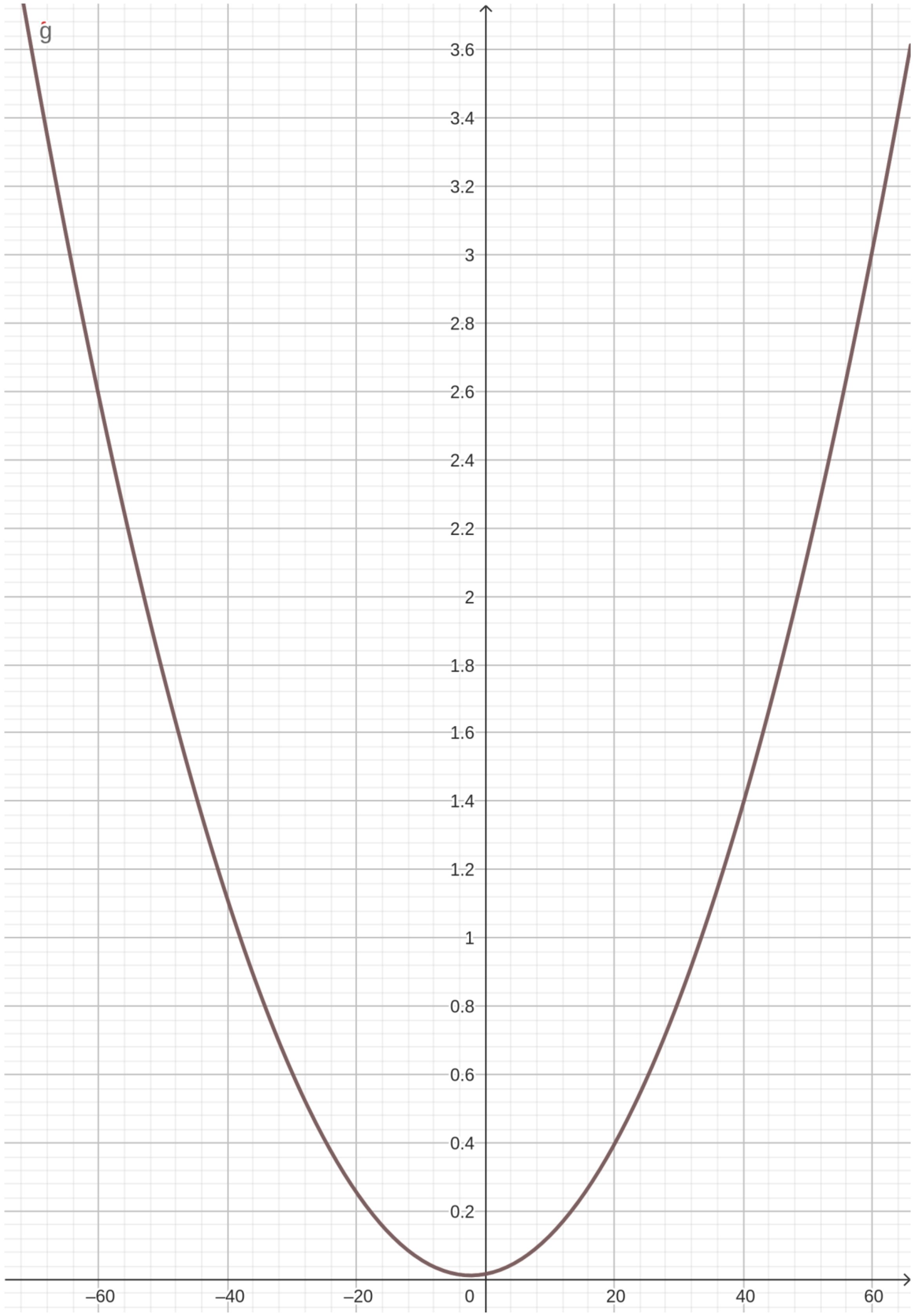
Equation and line for insertion sort:
g(x)=0.0007720449317 x^(2)+0.0035193617891 x+0.0167006105933



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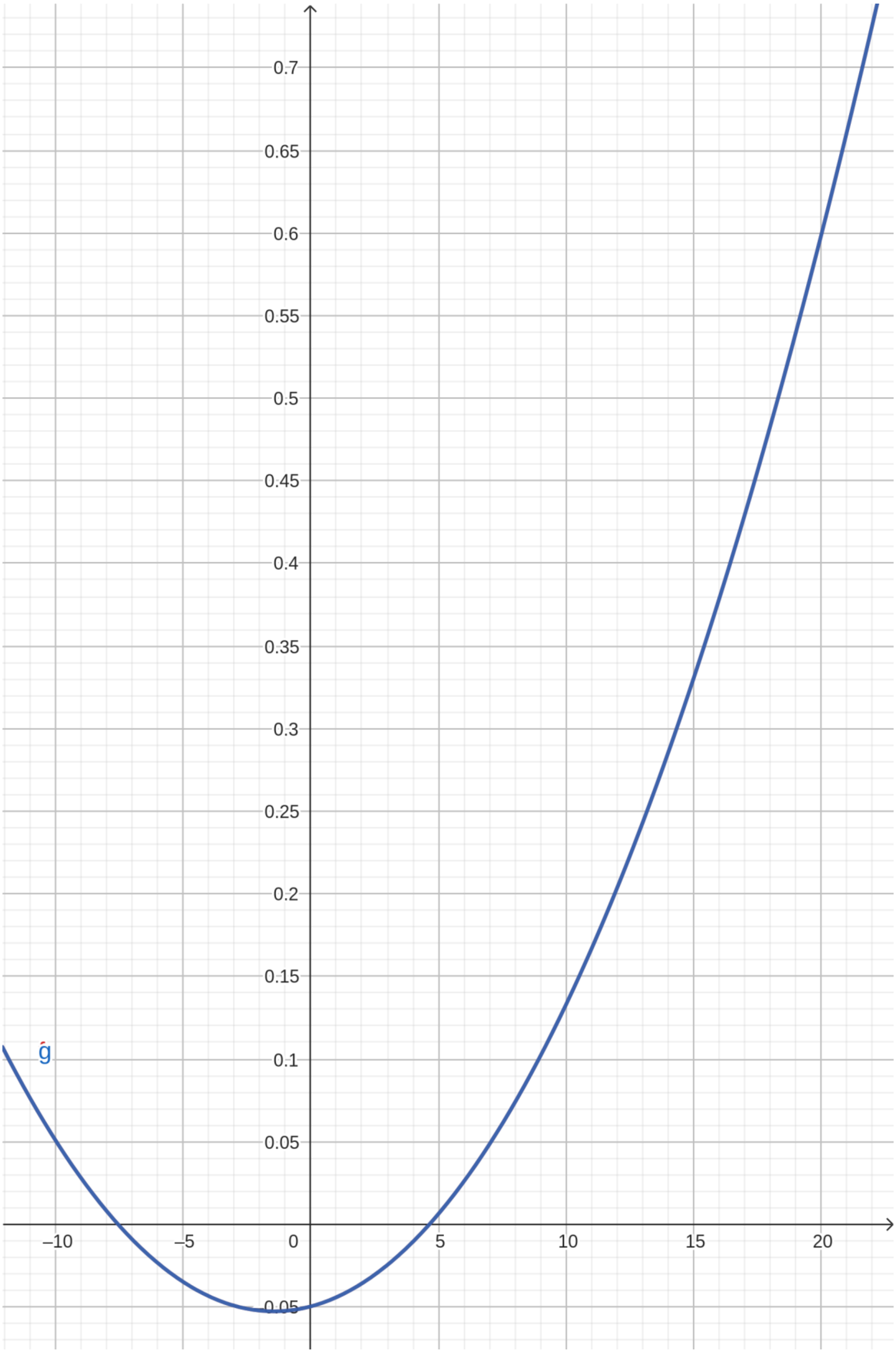
Equation and line for Selection sort:
g(x)=0.0014116239559 x^(2)+0.0041150659886 x-0.0497185642815



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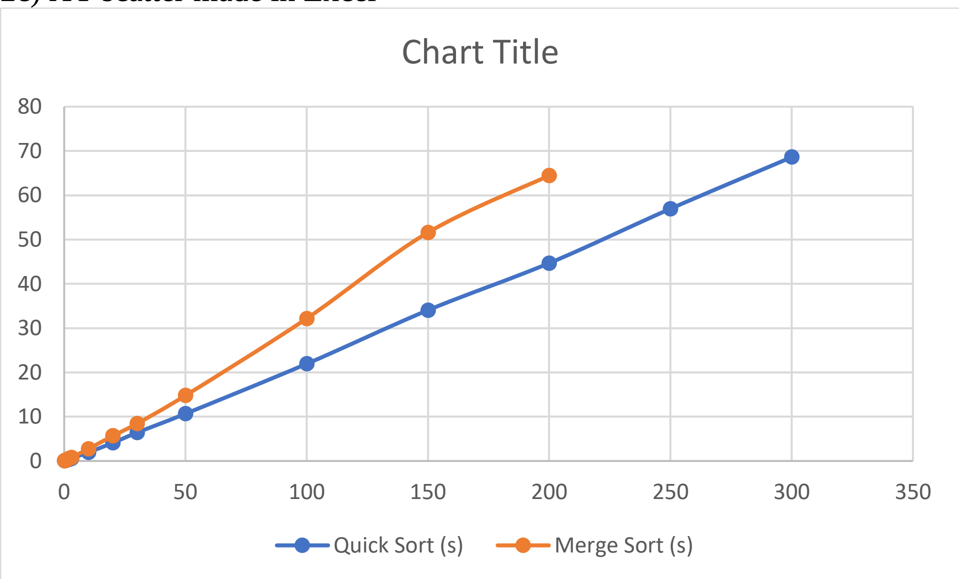
2a and 2b)

Array Size (in millions)	Quick Sort (s)	Merge Sort (s)
.1	0.0247984	0.0301854
.2	0.0472827	0.0549248
.5	0.105937	0.13626
1	0.191394	0.264135
2	0.370604	0.546871
3	0.584291	0.790418
10	1.9604	2.74665
20	4.07862	5.65919
30	6.40181	8.43686
50	10.6707	14.7812
100	21.9419	32.1712
150	34.0513	51.5883
200	44.6781	64.4489
250	56.9538	
300	68.605	

2c) XY scatter made in Excel



2d) From the time analysis, the quick sort is shown to be consistently faster and better running than the merge sort at larger array sizes (The horizontal axis is array size in millions and the vertical axis is the time in seconds). The lines do not cross, showing that the quick sort is over all better than merge sort. However, they start of VERY similar in the beginning and prove to both be efficient in

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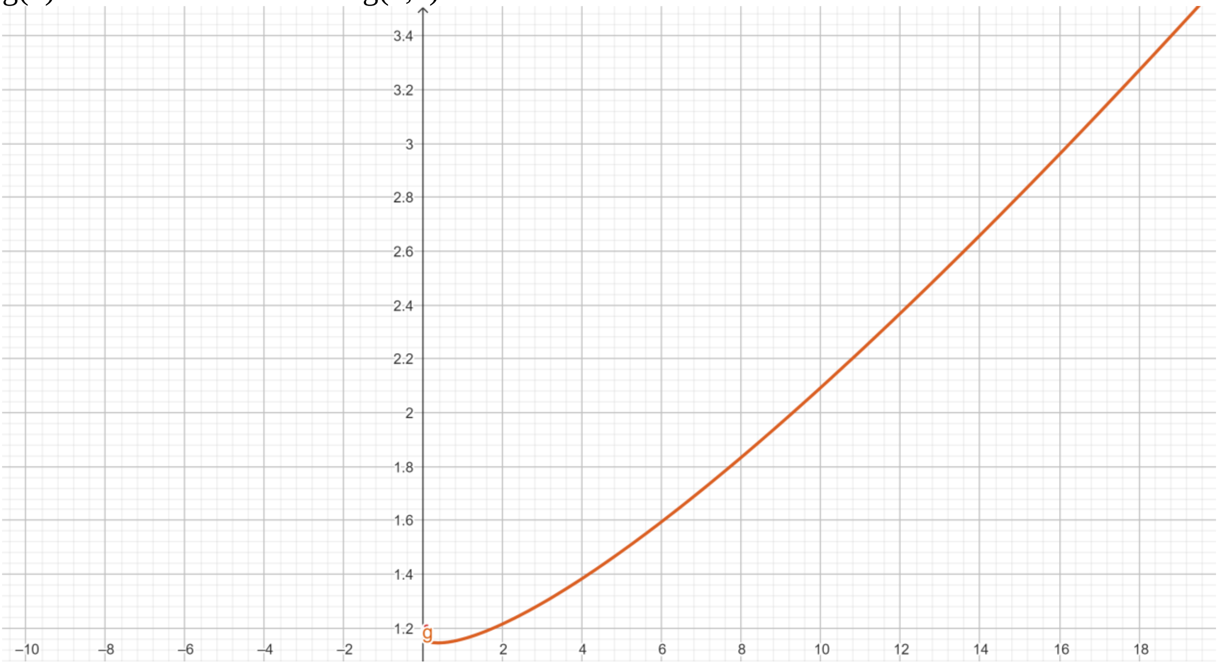
smaller array sizes, even more so than the three types of sorts we have observed earlier in this experiment. There is no consistency in how much faster quick sorts are than merge sorts. As array size grows, the gap between speeds grows bigger, it is never consistently double the speed, 1.5 the speed, etc. The speed difference between the two sorts grows bigger the more the array size grows.

2e)
Equation and Line for Quick Sort:
g(x)=0.0281320504444 x log(2,x)+1.1595017878484



Equation and Line for Merge Sort:
h(x)=0.0437162004833 x log(2,x)+1.0872936672917