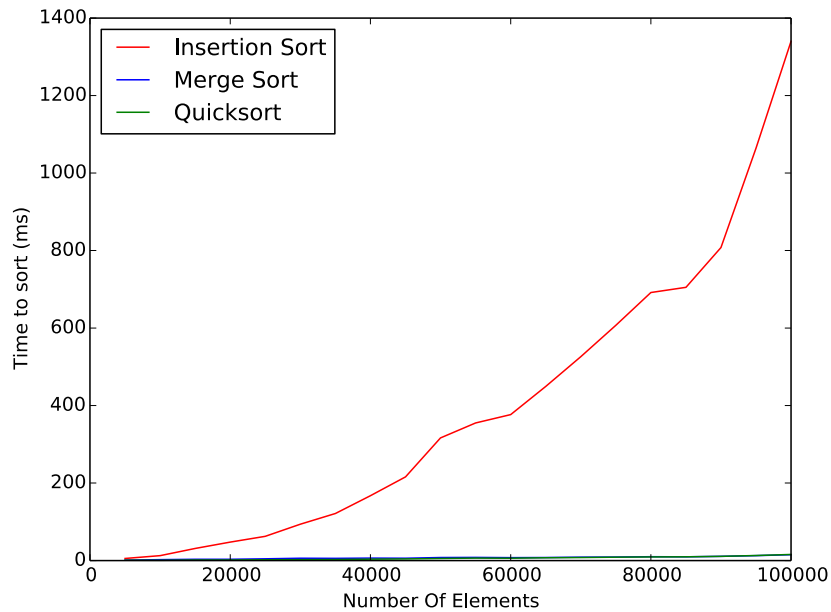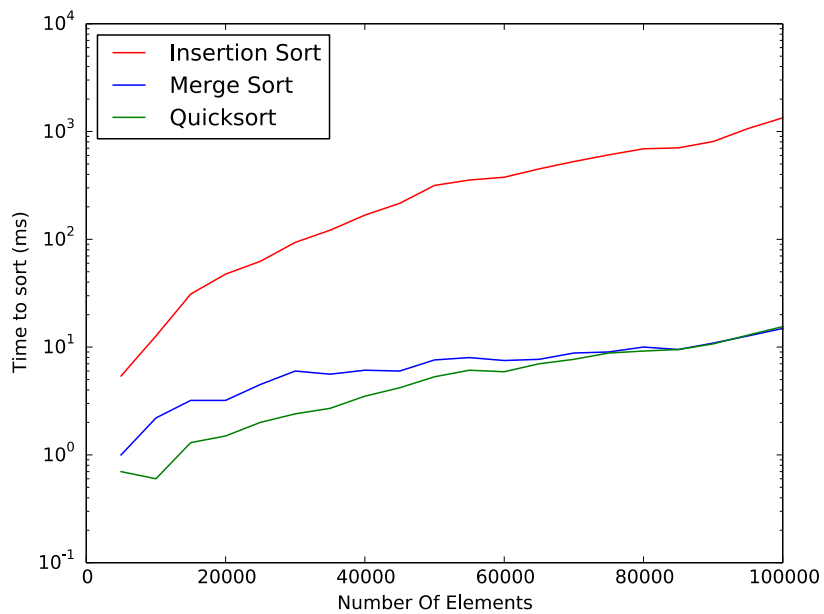Matt Drill
COP4400
Dr. Mihaela Cardei
Programming Assignment

Comparing the runtimes of different algorithms.

Comparison on a logarithmic scale (This wasn't in the assignment, but it shows the merge and quicksorts more clearly)

Insertion Sort

N of Elements	Actual Value	Theoretical value	Actual/Theoretical
5000	5.1	25000000	0.000000204
10000	13.1	100000000	0.000000131
15000	22.9	225000000	1.01778E-07
20000	48	400000000	0.00000012
25000	62.4	625000000	9.984E-08
30000	105.8	900000000	1.17556E-07
35000	134.3	1225000000	1.09633E-07
40000	166.3	1600000000	1.03938E-07
45000	212.3	2025000000	1.0484E-07
50000	268.6	2500000000	1.0744E-07
55000	314.4	3025000000	1.03934E-07
60000	379.3	3600000000	1.05361E-07
65000	441.5	4225000000	1.04497E-07
70000	514.8	4900000000	1.05061E-07
75000	596.1	5625000000	1.05973E-07
80000	672.5	6400000000	1.05078E-07
85000	765.9	7225000000	1.06007E-07
90000	841	8100000000	1.03827E-07
95000	907.6	9025000000	1.00565E-07
100000	1032.7	10000000000	1.0327E-07

	Approxiate Hidden Constant		0.000000204

Merge Sort

N of Elements	Actual Value	Theoretical value	Actual/Theoretical
5000	1.2	61438.5619	1.95317E-05
10000	2.6	132877.1238	1.95669E-05
15000	2.2	208090.1232	1.05723E-05
20000	3.6	285754.2476	1.25982E-05
25000	4.8	365241.0119	1.3142E-05
30000	6.7	446180.2464	1.50164E-05
35000	6.4	528327.3556	1.21137E-05
40000	6	611508.4952	9.8118E-06
45000	5.2	695593.6821	7.47563E-06
50000	6.7	780482.0237	8.58444E-06
55000	6.9	866092.9199	7.96681E-06

60000	6.9	952360.4928	7.24516E-06
65000	8.2	1039229.886	7.89046E-06
70000	8.6	1126654.711	7.63322E-06
75000	9.4	1214595.223	7.7392E-06
80000	10	1303016.99	7.6745E-06
85000	11	1391889.894	7.90292E-06
90000	11.1	1481187.364	7.49399E-06
95000	11.2	1570885.79	7.12974E-06
100000	12.3	1660964.047	7.40534E-06

Approxiate Hidden Constant   1.95669E-05

Quicksort

N of Elements	Actual Value	Theoretical value	Actual/Theoretical
5000	0.4	25000000	0.000000016
10000	0.7	100000000	0.000000007
15000	1.1	225000000	4.88889E-09
20000	1.8	400000000	4.5E-09
25000	2.1	625000000	3.36E-09
30000	2.9	900000000	3.22222E-09
35000	3.3	1225000000	2.69388E-09
40000	3.6	1600000000	2.25E-09
45000	4.3	2025000000	2.12346E-09
50000	4.9	2500000000	1.96E-09
55000	5.5	3025000000	1.81818E-09
60000	5.9	3600000000	1.63889E-09
65000	6.6	4225000000	1.56213E-09
70000	7.6	4900000000	1.55102E-09
75000	8.7	5625000000	1.54667E-09
80000	9.5	6400000000	1.48438E-09
85000	10.3	7225000000	1.42561E-09
90000	11.4	8100000000	1.40741E-09
95000	11.4	9025000000	1.26316E-09
100000	13.1	10000000000	1.31E-09

Approxiate Hidden Constant   0.000000016