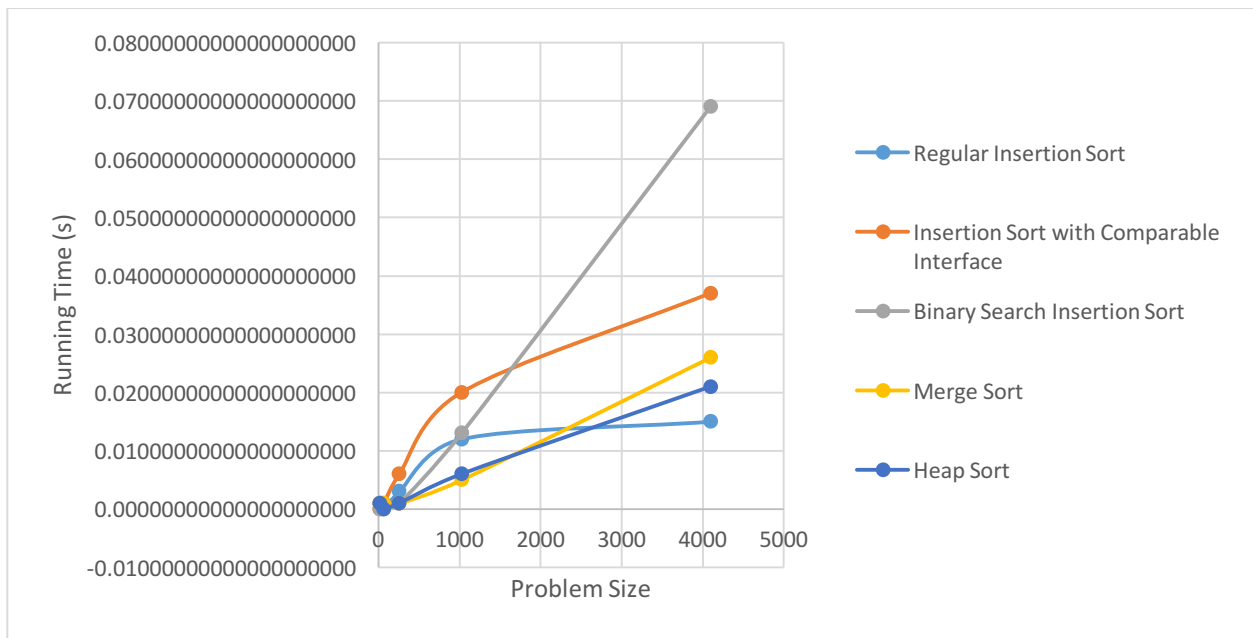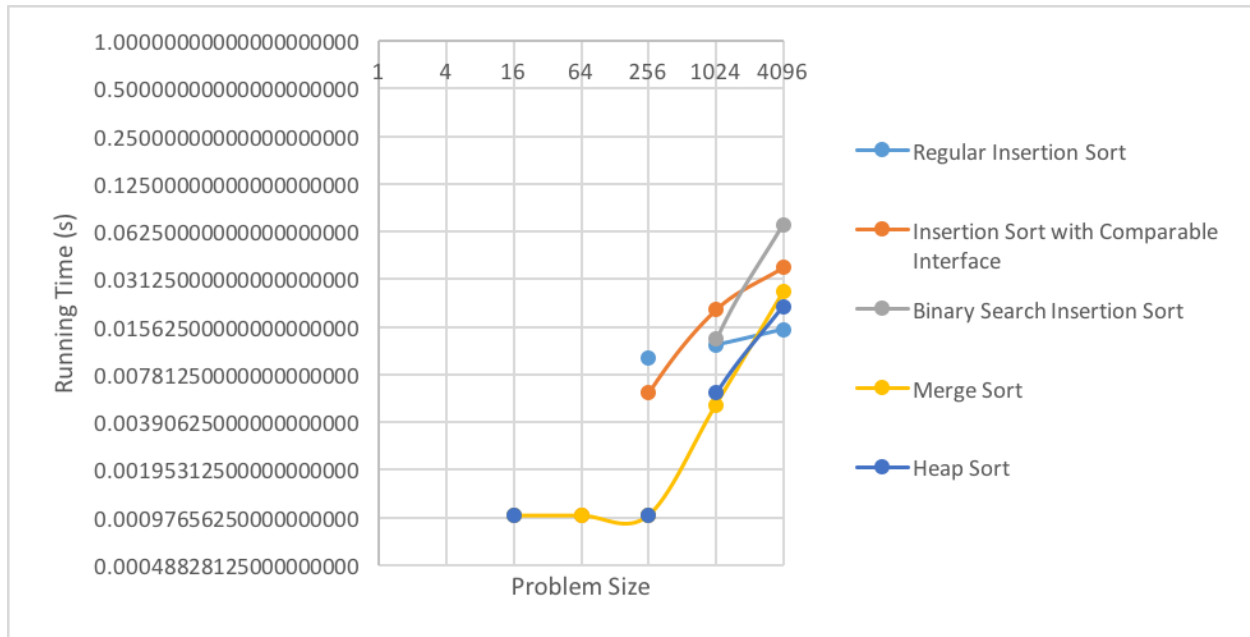# Running Time vs Problem Size

Problem Size	Regular Insertion Sort Execution Time (s)	Insertion Sort with Comparable Interface Execution Time (s)	Binary Search Insertion Sort Execution Time (s)	Merge Sort Execution Time (s)	Heap Sort Execution Time (s)
16	0.00100	0.00000	0.00000	0.00099	0.00099
64	0.00000	0.00100	0.00000	0.00100	0.00000
256	0.00300	0.00599	0.00099	0.00100	0.00099
1024	0.01199	0.02000	0.01299	0.00500	0.00599
4096	0.01500	0.03699	0.06900	0.02600	0.02099

Running Time vs Problem Size

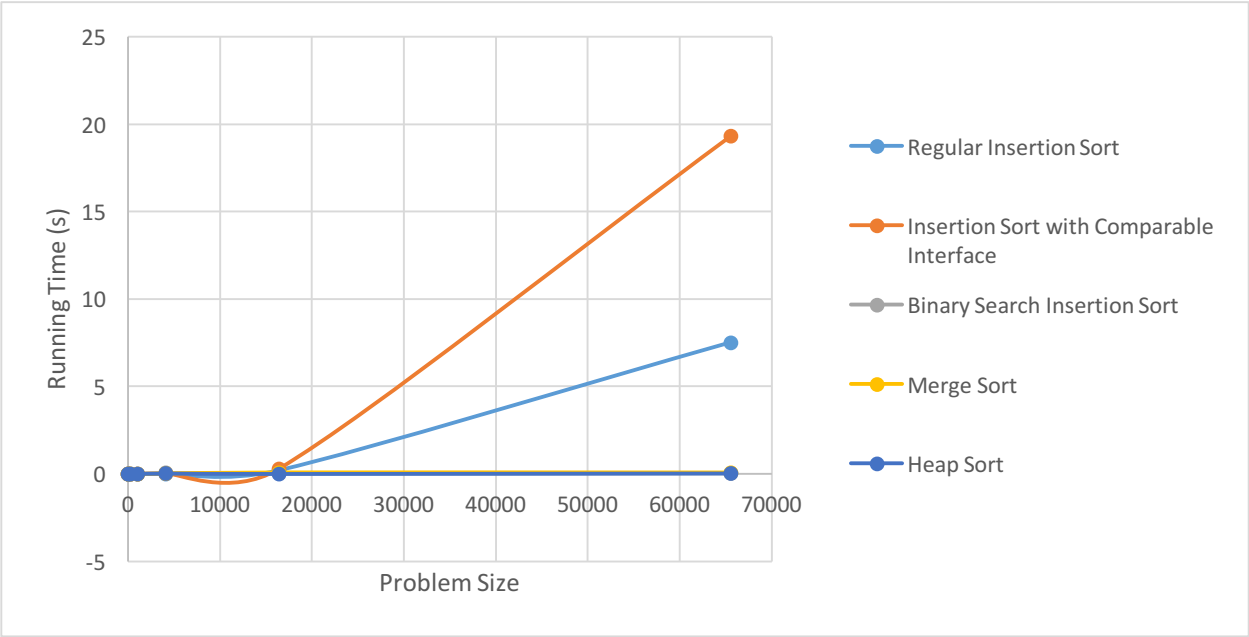## Running Time vs Problem Size (log-log Scale)

Hypothesis, Prediction and Verification

Sorting Implementation	Hypothesized Running Time	Predicted Running Time for 2^14 (s)	Predicted Running Time for 2^16 (s)	Actual Running Time for 2^14 (s)	Actual Running Time for 2^16 (s)
Regular Insertion Sort	O(logn)	0.01199/log1024*log(16384) = 0.00505	0.01199/log1024*log(65536) = 0.00577	0.21200000000000002	7.5120000000000005
Insertion Sort with Comparable Interface	O(n)	0.02000/1024*(16384) = 0.32	0.02000/1024*(65536) = 1.28	0.291	19.32
Binary Search Insertion Sort	O(n^2)	0.01299/1024^2*(16384)^2 = 3.32544	0.01299/1024^2*(65536)^2 = 53.2	0.04199999999999998	0.043999999999999984
Merge Sort	O(n^2)	0.00500/1024^2*(16384)^2 = 1.28	0.00500/1024^2*(65536)^2 = 20.48	0.07199999999999998	0.069

Heap Sort	O(n^2)	0.00599/1024^2 *(16384)^2 = 1.53344	0.00599/1024^2 *(65536)^2 = 24.53504	0.007000000 000000006	0.027000000 000000024

Extended Time vs Problem Size

Extended Running Time vs Problem Size (log-log Scale)