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Task:
Assignment 3 (Benchmark)

Relationship Conclusion:
For random array:
$y = 8.0*10^{(-7)}*x^2$
For ordered array:
$y = 2.0*10^{(-6)}*x + 0.0482$
For partially-ordered array:
$y = 5.8*10^{(-7)}*x^2$
For reverse-ordered array:
$y = 1.5*10^{(-6)}*x^2$

Evidence to support that conclusion:
Timing observations – Random

N	Time(ms)	logN	logTime
5000	18.40535583	12.2877124	4.20205374
10000	71.69589714	13.2877124	6.16381866
20000	285.3920275	14.2877124	8.15680122
40000	1144.325148	15.2877124	10.1602813
80000	4538.547308	16.2877124	12.1480149

Timing observations – Sorted

N	Time(ms)	logN	logTime
5000	0.12846502	12.2877124	-2.9605525
10000	0.06992423	13.2877124	-3.8380637
20000	0.08099122	14.2877124	-3.6260907
40000	0.10655835	15.2877124	-3.2302844
80000	0.18488128	16.2877124	-2.4353289

Timing observations – Reversed

N	Time(ms)	logN	logTime
5000	35.87179953	12.2877124	5.16477822
10000	142.0956262	13.2877124	7.15071834
20000	569.4341921	14.2877124	9.15338531
40000	2273.46579	15.2877124	11.1506776
80000	8985.729714	16.2877124	13.13342

Timing observations – partially-ordered

N	Time(ms)	logN	logTime
5000	13.77097669	12.2877124	3.78355898
10000	53.32284793	13.2877124	5.73668193
20000	213.1243499	14.2877124	7.73555162
40000	857.5687667	15.2877124	9.74410855
80000	3423.029114	16.2877124	11.7410578

Graphical Representation:

Insertion Sort

$$y = 2E\text{-}06x + 0.0482$$
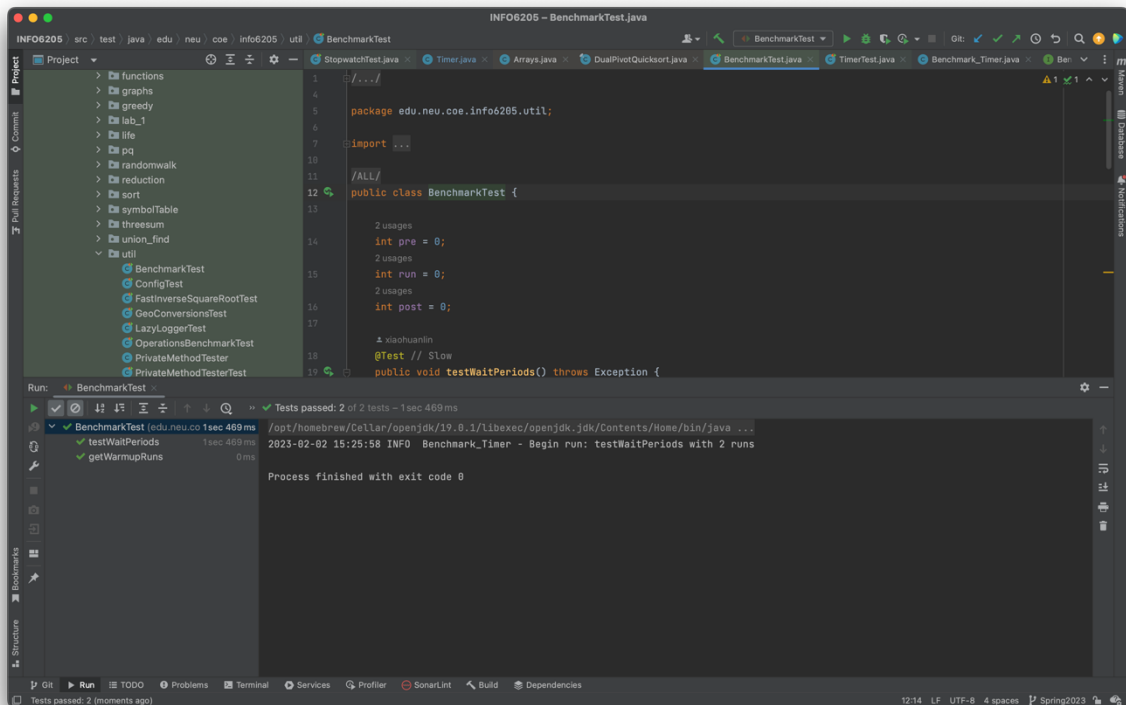$$R^2 = 0.9869$$
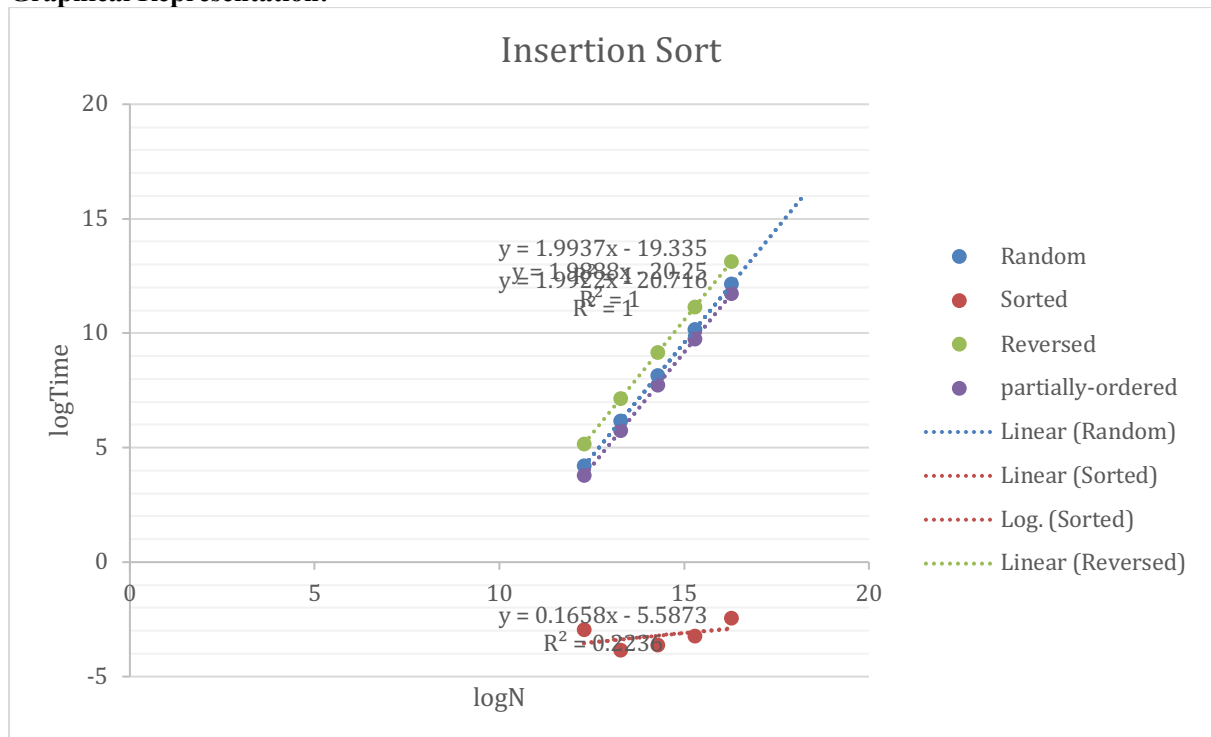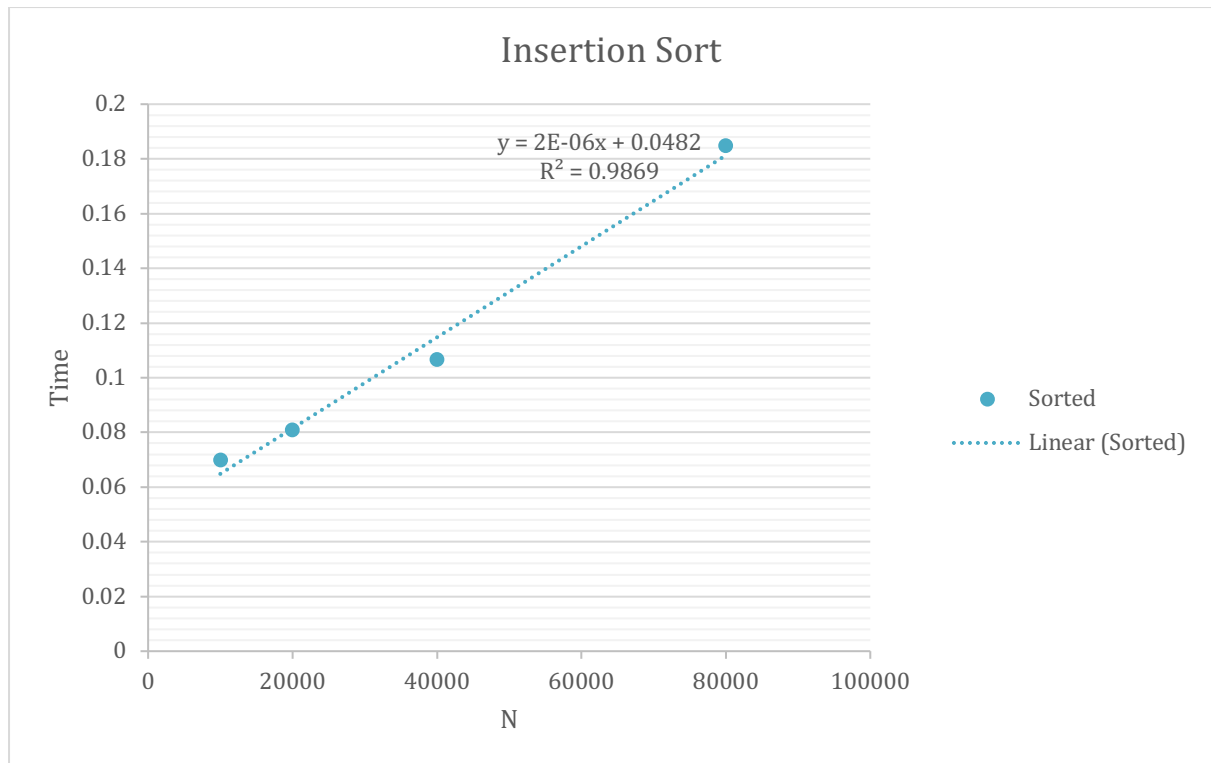
Unit Test Screenshots:
Timer Test:
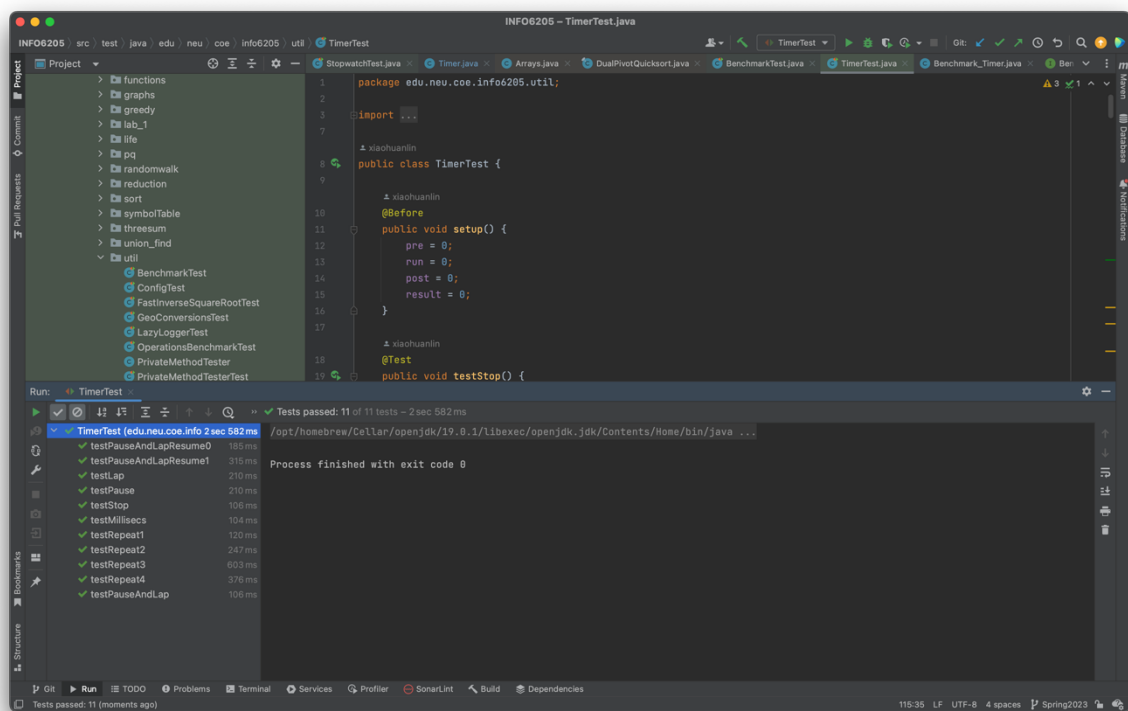
Benchmark Test:

Insertion Sort Test: