2)

a)

Elapsed time in nanoseconds for original merge sort: 11350700

d)

Elapsed time in nanoseconds for improved merge sort with max\_level=13: 5384800

As we can see here, there is a visible difference between merge sort time (which is given in part a).

Improved merge sort is faster than normal merge sort.

e)

Max level: 1, Elapsed time in nanoseconds: 329211700

Max level: 2, Elapsed time in nanoseconds: 224021100

Max level: 3, Elapsed time in nanoseconds: 86305500

Max level: 4, Elapsed time in nanoseconds: 58346300

Max level: 5, Elapsed time in nanoseconds: 22668500

Max level: 6, Elapsed time in nanoseconds: 15624300

Max level: 7, Elapsed time in nanoseconds: 6388500

Max level: 8, Elapsed time in nanoseconds: 5338500

Max level: 9, Elapsed time in nanoseconds: 3474400

Max level: 10, Elapsed time in nanoseconds: 3372200

Max level: 11, Elapsed time in nanoseconds: 3269700

Max level: 12, Elapsed time in nanoseconds: 3680500

Max level: 13, Elapsed time in nanoseconds: 4131100

Max level: 14, Elapsed time in nanoseconds: 4433700

Max level: 15, Elapsed time in nanoseconds: 4962700

Max level: 16, Elapsed time in nanoseconds: 5507400

Max level: 17, Elapsed time in nanoseconds: 7544500

These are the running time for different levels. I executed this code many times. Best Max level was mostly 11 and sometimes 10. But mostly I got 11 as best max level so,

Best max level: 11, Min elapsed time in nanoseconds: 3269700

Also, the running time is better than part a running time and part d running time.

There was a small mistake in insertion\_sort2 and after a research I fixed the issue.