## Clock accuracy:

E.g.

clock\_t start, end;

start = clock();

    quick\_sort(arr, 0, MAX - 1);

    end = clock();

     max\_time = (**double**)(end - start) / CLOCKS\_PER\_SEC;

## check out correctness:

random arr

30 2 85 10 16 70 97 37 3 92

after insertion sort

2 3 10 16 30 37 70 85 92 97

random arr

74 80 38 72 29 96 30 27 13 14

after quick sort

13 14 27 29 30 38 72 74 80 96

random arr

39 43 65 32 74 93 26 23 38 92

after merge sort

23 26 32 38 39 43 65 74 92 93

random arr

82 68 95 67 30 11 89 28 0 44

after heap sort

0 11 28 30 44 67 68 82 89 95

# Worse-case generation:

Insertion sort:

n, n-1, n-2,……, 0

merge sort: bigger, smaller, bigger, smaller,

5, 10, (2)+5, (2)+10, (6)+5, (6)+10……

heap sort and quick sort:

generate random permutations of the desired size: permutates more than(exe multiple times) 100000 times for each n respectively, and pick the max run time.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | N=500 | N=1000 | N=2000 | N=3000 | N=5000 |
| Insertion | 0.000708 | 0.002573 | 0.010271 | 0.023239 | 0.064764 |
| Merge | 0.000041 | 0.011443 | 0.000177 | 0.000264 | 0.000457 |
| Quick | 0.000770 | 0.001490 | 0.010369 | 0.011877 | 0.013269 |
| heap | 0.008574 | 0.011096 | 0.012225 | 0.012702 | 0.012833 |
| Worst case data for… | N=500 | N=1000 | N=2000 | N=3000 | N=5000 | In other sorting |
| Insertion | 0.000030/ 0.000093/ 0.000065 | 0.000064/ 0.000076/ 0.000148 | 0.000165/ 0.000172/ 0.000227 | 0.000229/ 0.000219/ 0.000350 | 0.000417/ 0.000405/ 0.000612 | Merge/  quick/  heap |
| Merge | 0.000641/ 0.000096/ 0.000064 | 0.002841/ 0.000076/ 0.000123 | 0.010745/ 0.000163/ 0.000228 | 0.023979/ 0.000225/ 0.000355 | 0.065627/ 0.000381/ 0.000588 | insertion/quick/heap |
| Quick | 0.000030 /  0.000339/ 0.000058 | 0.000063  /  0.001300  / 0.000109 | 0.000139/ 0.005340/ 0.000234 | 0.000210/ 0.013323/ 0.000347 | 0.000425/  0.031814/ 0.000579 | Merge/insertion/heap |
| heap | 0.000030/  0.000110/  0.000323 | 0.000092/ 0.000149/ 0.002264 | 0.000157/ 0.000208/ 0.005181 | 0.000211/  0.000294/ 0.012131 | 0.000383/ 0.000459/ 0.031596 | Merge/quick/insertion |