104062261 Algorithm HW8 Report

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Find 3500-th smallest number with 6000 elements
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1.SELECT algorithm(groups of 5): 125502061
2.SELECT algorithm(groups of 7): 125502061
3.SELECT algorithm(groups of 9): 125502061
3.Heapsort: 125502061
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Find 0001-th smallest number with 7000 elements
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1.SELECT algorithm(groups of 5): 138173
2.SELECT algorithm(groups of 7): 138173
3.SELECT algorithm(groups of 9): 138173
3.Heapsort: 138173
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Find 6666-th smallest number with 8000 elements
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1.SELECT algorithm(groups of 5): 178343465
2.SELECT algorithm(groups of 7): 178343465
3.SELECT algorithm(groups of 9): 178343465
3.Heapsort: 178343465
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Find 0123-th smallest number with 9000 elements
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1.SELECT algorithm(groups of 5): 3174627
2.SELECT algorithm(groups of 7): 3174627
3.SELECT algorithm(groups of 9): 3174627
3.Heapsort: 3174627
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Find 9999-th smallest number with 10000 elements
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1.SELECT algorithm(groups of 5): 214739111
2.SELECT algorithm(groups of 7): 214739111
3.SELECT algorithm(groups of 9): 214739111
3.Heapsort: 214739111
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===================Running time==================
=================================================
|| Tn | S5 | S7 | S9 | HS ||
=================================================
||  1000: 0.000089 0.000082 0.000084 0.000172 ||
||  2000: 0.000170 0.000160 0.000161 0.000366 ||
||  3000: 0.000263 0.000235 0.000216 0.000489 ||
||  4000: 0.000279 0.000277 0.000284 0.000653 ||
||  5000: 0.000346 0.000328 0.000337 0.000836 ||
||  6000: 0.000434 0.000386 0.000403 0.001068 ||
||  7000: 0.000461 0.000454 0.000445 0.001215 ||
||  8000: 0.000545 0.000550 0.000525 0.001406 ||
||  9000: 0.000616 0.000682 0.000618 0.001722 ||
|| 10000: 0.000672 0.000646 0.000630 0.001744 ||
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For the SELECT algorithm part, we can see that if we divided the elements into groups 7 and 9, the running time is very close to we divided the elements into groups 5, and all of those are also run in linear time.

For the Heapsort compare to the Select algorithm, because time complexity of each are $O(nlgn)$ and $O(n)$, so we can see that the Heapsort running time is larger than the select algorithm. However, Heapsort is to sorting all of those elements, SELECT algorithm is using for find out the k-th smallest or largest element, the idea of those two are not the same.