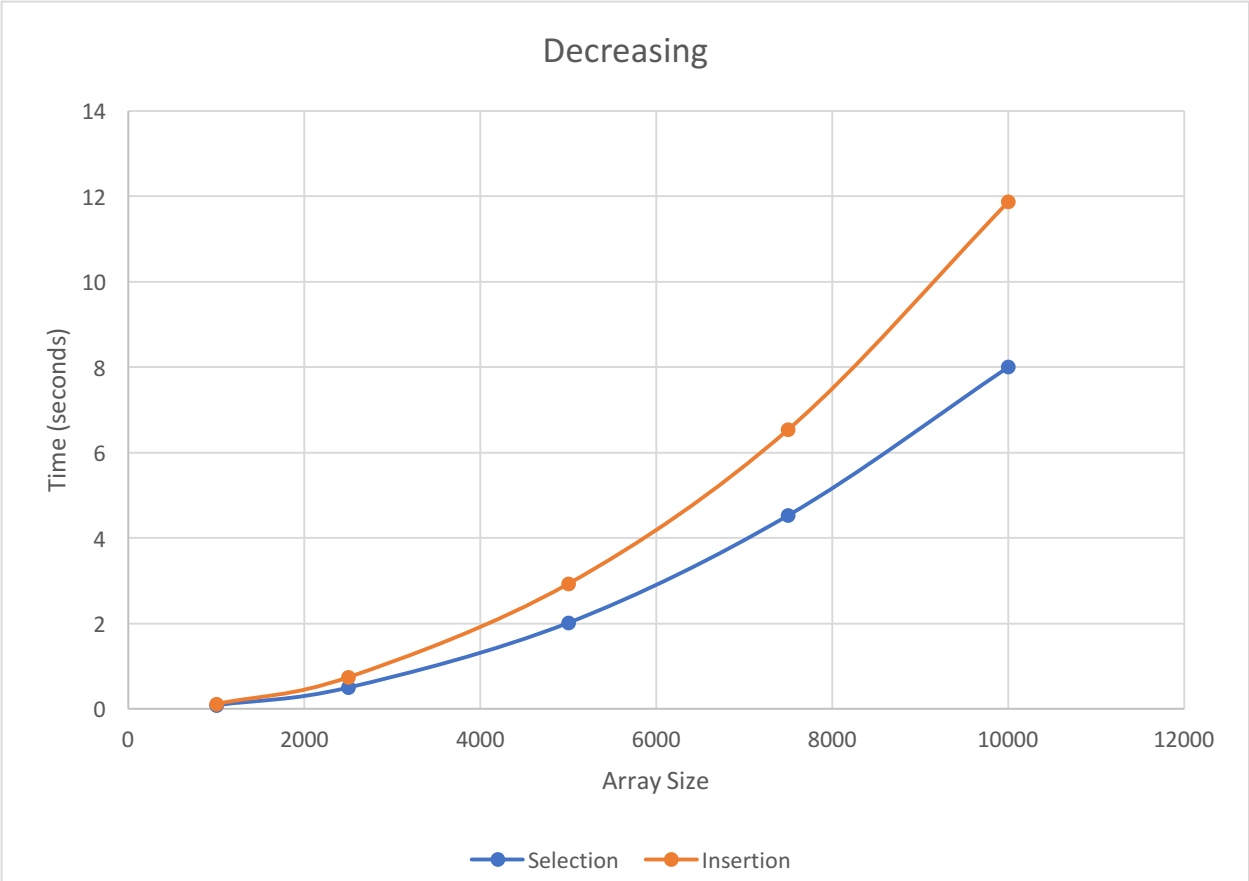
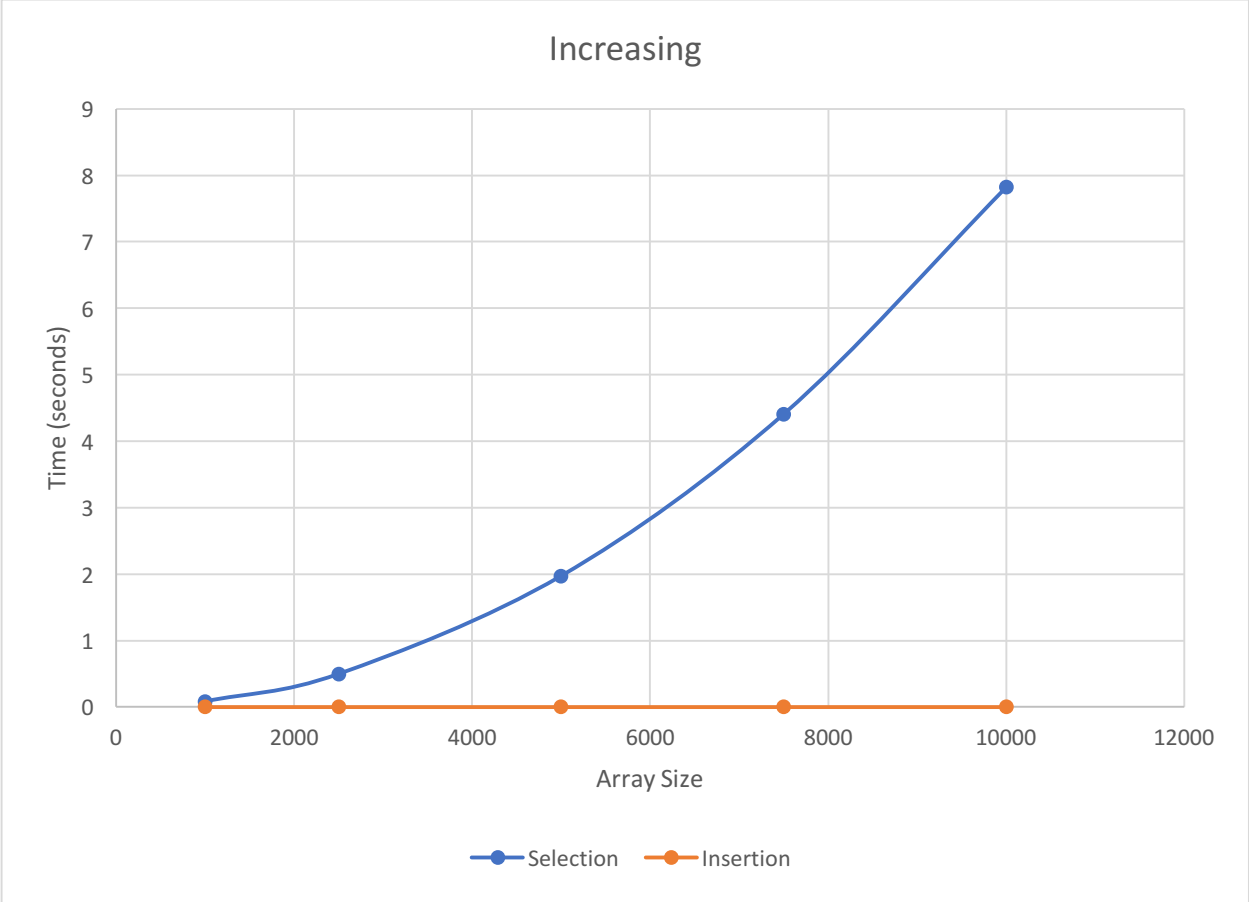

Decreasing
Time (seconds)
0
2
4
6
8
10
12
14
0
2000
4000
6000
8000
10000
12000
Array Size
Selection
Insertion


Random
Time (seconds)
0
1
2
3
4
5
6
7
8
9
0
2000
4000
6000
8000
10000
12000
Array Size
Selection
Insertion




Comparison of Graphs:

**Decreasing:** The insertion function takes a longer to execute compared to its counter-part in the selection function sort. The insertion function requires for all the values in the array to move the furthest position away each time since it is in the complete opposite position from where the value needs to be. Both of the plots, however, have a quadratic shape since they go through two different loops making a form of $y=x^2$.

**Random:** The selection function on average takes longer than the insertion function when the arrays are created with a random number ordered randomly. This occurs because the function is forced to look through each index in the array to find the lowest value in the array while in the insertion function just compares the position of the current index and thus works at a quicker speed in order to sort the entire array. Again, the shape of both plots are quadratic due to the use of two loops.

**Increasing:** The insertion is the most time efficient function when it comes to sorting an already sorted array. It takes close to no time to go through all indexes and assure that the array is already in order. The selection function, however, still goes through each index verifying that

said position is the least value, taking up pointless time. Both graphs has a form of the quadratic graph even though it does not seem like so in the insertion plot since there is barely any change.

**Table of Trials** (Right side is selection, left side is insertion / goes down from 1000,2500, ⋯, 10000):

| Increasing | Decreasing | Random |
|---|---|---|
| 0.084887 | 0.080216 | 0.07914 |
| 0.081557 | 0.080874 | 0.076749 |
| 0.08728 | 0.081982 | 0.078047 |
| 0.081261 | 0.079819 | 0.082935 |
| 0.080833 | 0.084445 | 0.080942 |
| 0.0831636 Increasing | 0.0814672 Decreasing | 0.0795626 Random |
| 0.489621 | 0.506236 | 0.51111 |
| 0.505051 | 0.487109 | 0.505539 |
| 0.479855 | 0.494819 | 0.500168 |
| 0.496688 | 0.496118 | 0.486393 |
| 0.517493 | 0.494977 | 0.506814 |
| 0.4977416 Increasing | 0.4958518 Decreasing | 0.5020048 Random |
| 1.929791 | 1.997467 | 1.975408 |
| 2.037295 | 1.958712 | 2.038473 |
| 1.969418 | 2.091779 | 1.980243 |
| 1.98892 | 1.970136 | 1.972505 |
| 1.935822 | 2.034865 | 1.971267 |
| 1.9722492 Increasing | 2.0105918 Decreasing | 1.9875792 Random |
| 4.380638 | 4.487568 | 4.424716 |
| 4.356043 | 4.421583 | 4.570272 |
| 4.516372 | 4.594392 | 4.44781 |
| 4.300147 | 4.407249 | 4.527821 |
| 4.475076 | 4.728597 | 4.34944 |
| 4.4056552 Increasing | 4.5278778 Decreasing | 4.4640118 Random |
| 7.781679 | 7.979251 | 7.91823 |
| 7.827684 | 7.93248 | 7.933905 |
| 7.679785 | 8.025933 | 7.829369 |
| 7.822181 | 7.921315 | 7.750325 |

| Increasing | Decreasing | Random |
|---|---|---|
| 0.000116 | 0.11367 | 0.061325 |
| 0.000207 | 0.109668 | 0.057825 |
| 0.000115 | 0.109503 | 0.057162 |
| 0.000134 | 0.115714 | 0.057742 |
| 0.000114 | 0.116879 | 0.061477 |
| 0.0001372 Increasing | 0.1130868 Decreasing | 0.0591062 Random |
| 0.000415 | 0.736323 | 0.387479 |
| 0.000337 | 0.769885 | 0.376789 |
| 0.000287 | 0.702588 | 0.363483 |
| 0.000287 | 0.72452 | 0.373631 |
| 0.000323 | 0.762625 | 0.378111 |
| 0.0003298 Increasing | 0.7391882 Decreasing | 0.3758986 Random |
| 0.000574 | 2.91335 | 1.506265 |
| 0.000579 | 2.887125 | 1.524749 |
| 0.000577 | 3.020388 | 1.515432 |
| 0.000576 | 2.897767 | 1.522984 |
| 0.000667 | 2.904598 | 1.53371 |
| 0.0005946 Increasing | 2.9246456 Decreasing | 1.520628 Random |
| 0.000874 | 6.543128 | 3.389147 |
| 0.000875 | 6.562756 | 3.379414 |
| 0.000886 | 6.527314 | 3.443669 |
| 0.000881 | 6.52971 | 3.387541 |
| 0.000884 | 6.519704 | 3.380638 |
| 0.00088 Increasing | 6.5365224 Decreasing | 3.3960818 Random |
| 0.00117 | 11.730269 | 5.967564 |
| 0.001172 | 11.75036 | 5.958565 |
| 0.001658 | 11.677679 | 6.012266 |
| 0.001164 | 11.719177 | 6.021308 |

| | | |
|---|---|---|
| 7.978247 | 8.133827 | 7.902482 |
| **7.8179152** | **7.9985612** | **7.8668622** |

| | | |
|---|---|---|
| 0.001166 | 12.438087 | 6.039647 |
| **0.001266** | **11.8631144** | **5.99987** |