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=x2.

**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** |  | **Increasing** | **Decreasing** | **Random** |
| 0.084887 | 0.080216 | 0.07914 |  | 0.000116 | 0.11367 | 0.061325 |
| 0.081557 | 0.080874 | 0.076749 |  | 0.000207 | 0.109668 | 0.057825 |
| 0.08728 | 0.081982 | 0.078047 |  | 0.000115 | 0.109503 | 0.057162 |
| 0.081261 | 0.079819 | 0.082935 |  | 0.000134 | 0.115714 | 0.057742 |
| 0.080833 | 0.084445 | 0.080942 |  | 0.000114 | 0.116879 | 0.061477 |
| **0.0831636** | **0.0814672** | **0.0795626** |  | **0.0001372** | **0.1130868** | **0.0591062** |
| **Increasing** | **Decreasing** | **Random** |  | **Increasing** | **Decreasing** | **Random** |
| 0.489621 | 0.506236 | 0.51111 |  | 0.000415 | 0.736323 | 0.387479 |
| 0.505051 | 0.487109 | 0.505539 |  | 0.000337 | 0.769885 | 0.376789 |
| 0.479855 | 0.494819 | 0.500168 |  | 0.000287 | 0.702588 | 0.363483 |
| 0.496688 | 0.496118 | 0.486393 |  | 0.000287 | 0.72452 | 0.373631 |
| 0.517493 | 0.494977 | 0.506814 |  | 0.000323 | 0.762625 | 0.378111 |
| **0.4977416** | **0.4958518** | **0.5020048** |  | **0.0003298** | **0.7391882** | **0.3758986** |
| **Increasing** | **Decreasing** | **Random** |  | **Increasing** | **Decreasing** | **Random** |
| 1.929791 | 1.997467 | 1.975408 |  | 0.000574 | 2.91335 | 1.506265 |
| 2.037295 | 1.958712 | 2.038473 |  | 0.000579 | 2.887125 | 1.524749 |
| 1.969418 | 2.091779 | 1.980243 |  | 0.000577 | 3.020388 | 1.515432 |
| 1.98892 | 1.970136 | 1.972505 |  | 0.000576 | 2.897767 | 1.522984 |
| 1.935822 | 2.034865 | 1.971267 |  | 0.000667 | 2.904598 | 1.53371 |
| **1.9722492** | **2.0105918** | **1.9875792** |  | **0.0005946** | **2.9246456** | **1.520628** |
| **Increasing** | **Decreasing** | **Random** |  | **Increasing** | **Decreasing** | **Random** |
| 4.380638 | 4.487568 | 4.424716 |  | 0.000874 | 6.543128 | 3.389147 |
| 4.356043 | 4.421583 | 4.570272 |  | 0.000875 | 6.562756 | 3.379414 |
| 4.516372 | 4.594392 | 4.44781 |  | 0.000886 | 6.527314 | 3.443669 |
| 4.300147 | 4.407249 | 4.527821 |  | 0.000881 | 6.52971 | 3.387541 |
| 4.475076 | 4.728597 | 4.34944 |  | 0.000884 | 6.519704 | 3.380638 |
| **4.4056552** | **4.5278778** | **4.4640118** |  | **0.00088** | **6.5365224** | **3.3960818** |
| **Increasing** | **Decreasing** | **Random** |  | **Increasing** | **Decreasing** | **Random** |
| 7.781679 | 7.979251 | 7.91823 |  | 0.00117 | 11.730269 | 5.967564 |
| 7.827684 | 7.93248 | 7.933905 |  | 0.001172 | 11.75036 | 5.958565 |
| 7.679785 | 8.025933 | 7.829369 |  | 0.001658 | 11.677679 | 6.012266 |
| 7.822181 | 7.921315 | 7.750325 |  | 0.001164 | 11.719177 | 6.021308 |
| 7.978247 | 8.133827 | 7.902482 |  | 0.001166 | 12.438087 | 6.039647 |
| **7.8179152** | **7.9985612** | **7.8668622** |  | **0.001266** | **11.8631144** | **5.99987** |