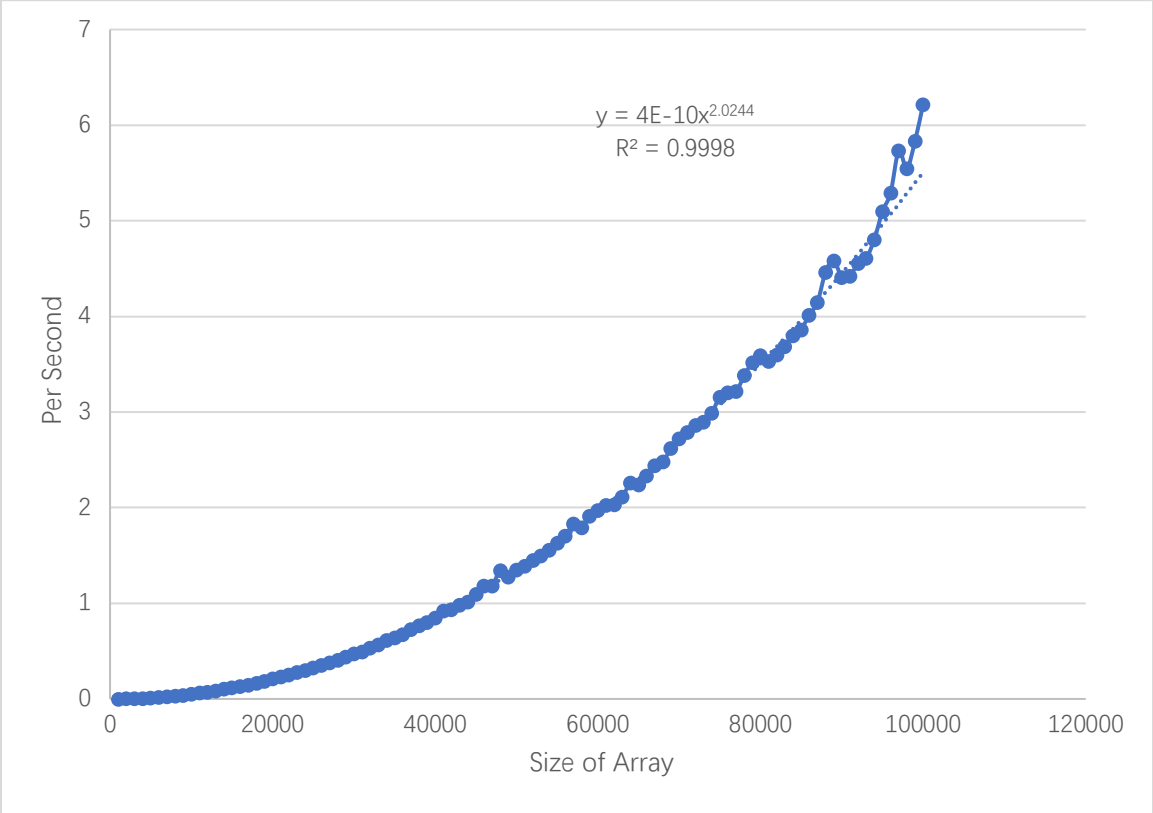
Insertion Sort



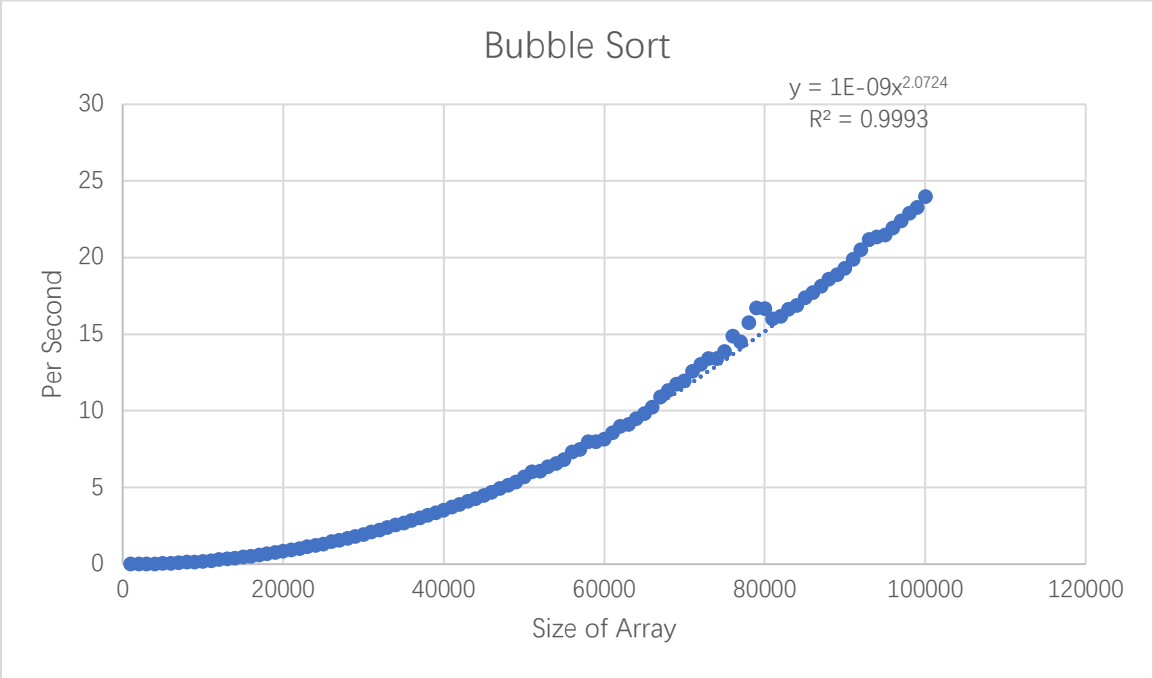
1. **Do the sorts we know to be of O(n^2) complexity demonstrate this behavior? (The iterative sorts)**

   Yes, as can be seen from this chart, when the size of array increase, the time of insertion sort needs rise dramatically

2. **For any plot points that are outliers (far away from the rest of the curve), how do you explain them?**

   For the insertion sort, the plot point outliers happened mostly when size is very large and require more time, and it is possible when the sorting algorism is requiring CPU for more resources in order to sort the data.

Bubble Sort



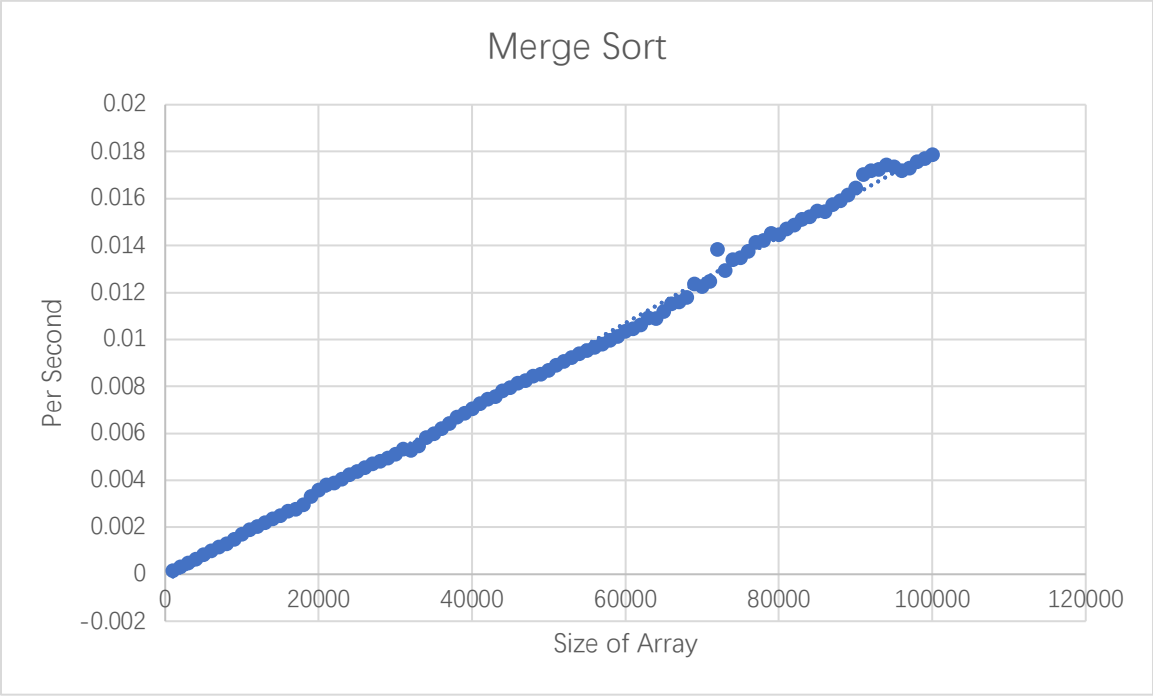
1. **Do the sorts we know to be of O(n^2) complexity demonstrate this behavior? (The iterative sorts)**

   Yes, as can be seen from this chart, when the size of array increase, the time of bubble sort needs rise dramatically

2. **For any plot points that are outliers (far away from the rest of the curve), how do you explain them?**

   As can be seen from the chart, those plot points are in the middle of the curve where around size of 80000 and between 15 second sorting time, which is quite long time period and during that time may be some other program is running which will cause it need more time to sort data.

Merge Sort



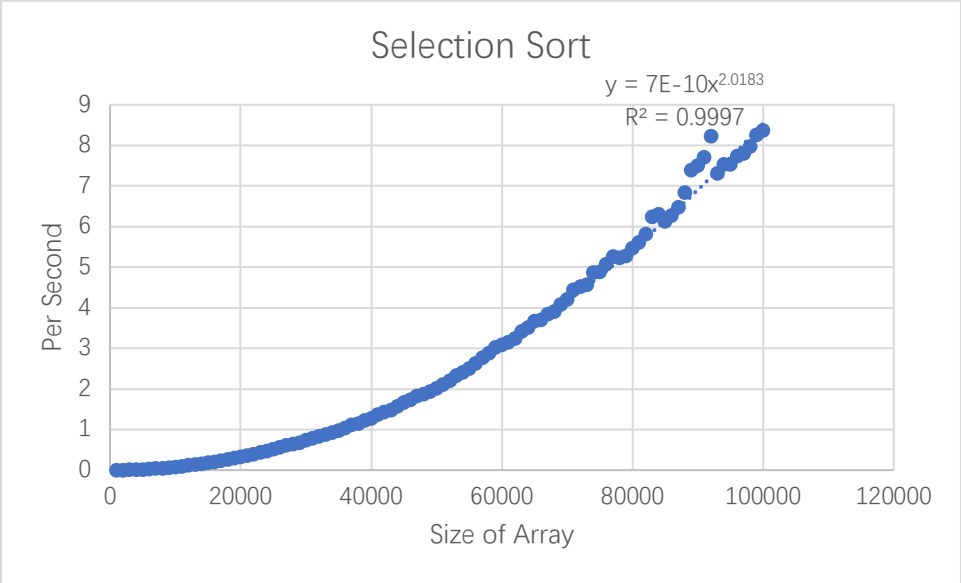
1. **Do the sorts we know to be of O(n*lg(n)) complexity demonstrate this behavior? (The recursive sorts)**

   No, as can be see even when sorting the size of 100000 it only need 0.018 second, which means the size we use for making this graph is not large enough to show it is n*lg n, and because merge sort is very powerful, the curve I have is mostly like a straight line.

2. **For any plot points that are outliers (far away from the rest of the curve), how do you explain them?**

   As can be seen from the chart, there are few of points that outliers, I think it may be both memory(ram) usage shifting and CPU time shifting will be influence it.

Selection Sort



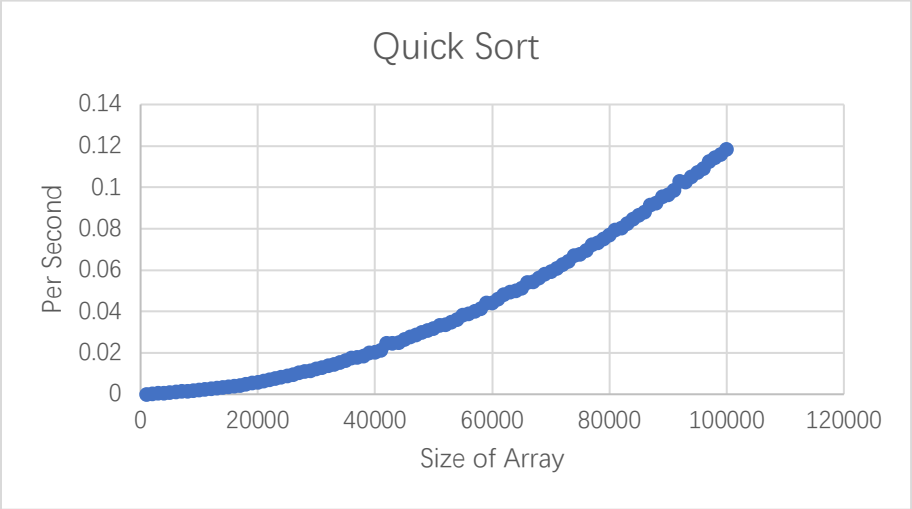
1. **Do the sorts we know to be of O(n^2) complexity demonstrate this behavior? (The iterative sorts)**

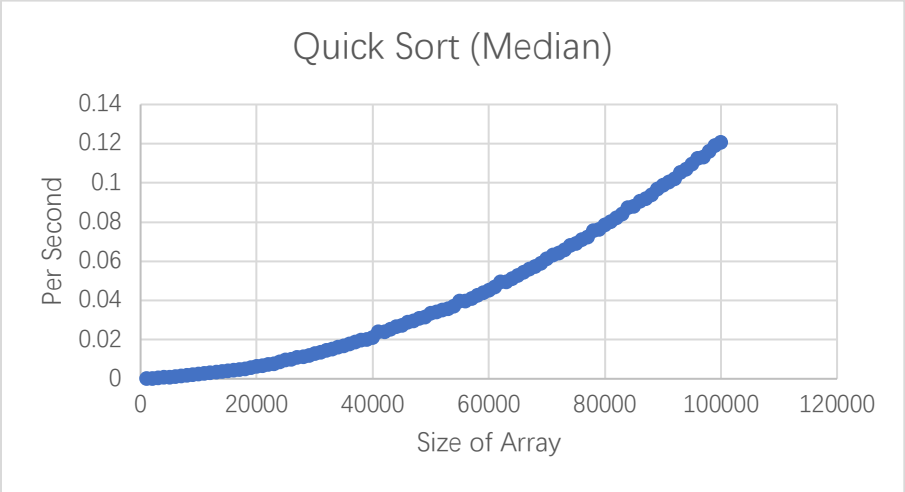
   Yes, as can be seen from this chart, when the size of array increase, the time of selection sort needs rise dramatically

2. **For any plot points that are outliers (far away from the rest of the curve), how do you explain them?**

   For the selection sort, the plot point outliers happened mostly when size is very large and require more time, and it is possible when the sorting algorism is requiring CPU for more resources in order to sort the data.

Quick Sort





1. **Do the sorts we know to be of O(n*lg(n)) complexity demonstrate this behavior? (The recursive sorts)**

   No, because we use rand() to generate random number in array, so it will become worst case of quick sort as O(n^2) which is showing in both charts above.

2. **For any plot points that are outliers (far away from the rest of the curve), how do you explain them?**

   For quick sort, there is not points that outliers can be found in both graphs above.