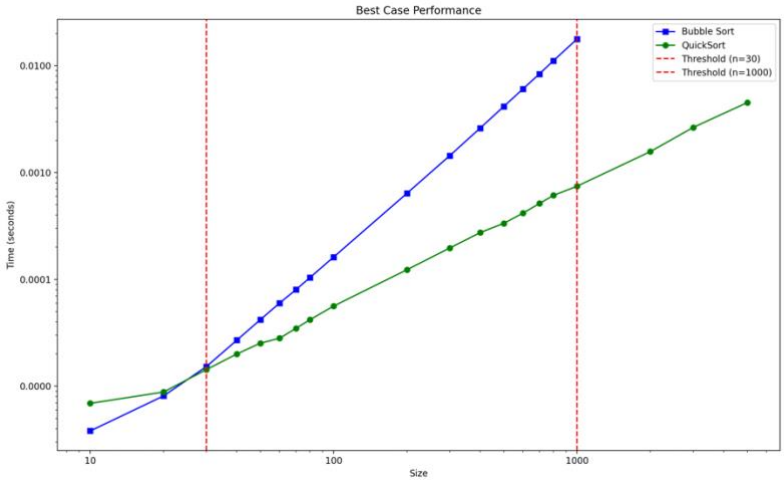
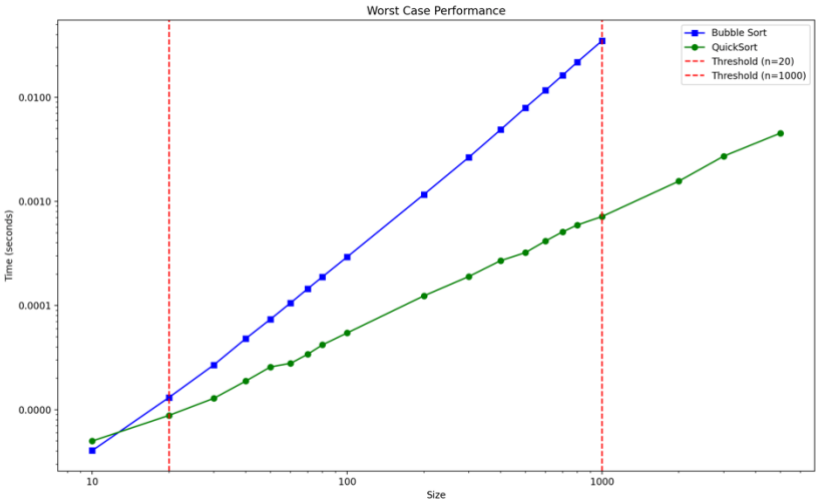
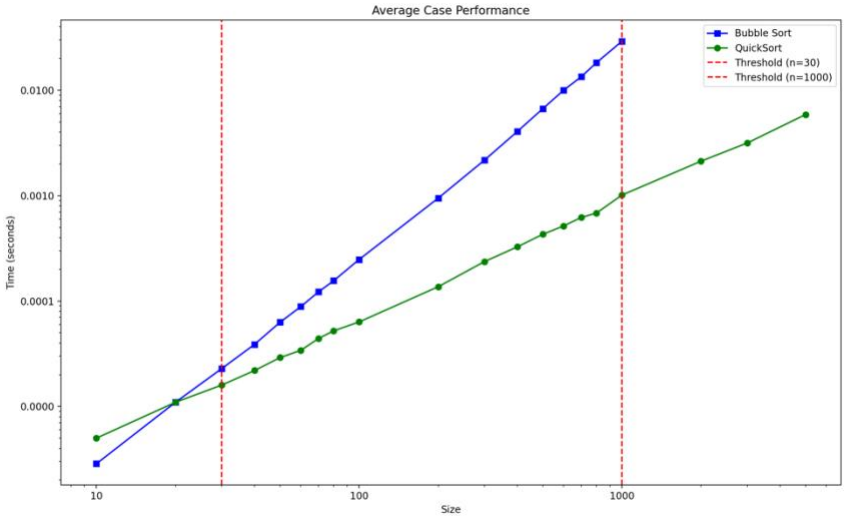
Exercise 2:

3.)


Best Case Performance
Bubble Sort
QuickSort
Threshold (n=30)
Threshold (n=1000)
Time (seconds)
0.0100
0.0010
0.0001
0.0000
10
100
1000
Size


Worst Case Performance
Bubble Sort
QuickSort
Threshold (n=20)
Threshold (n=1000)
Time (seconds)
0.0100
0.0010
0.0001
0.0000
10
100
1000
Size


Average Case Performance
Bubble Sort
QuickSort
Threshold (n=30)
Threshold (n=1000)
Time (seconds)
0.0100
0.0010
0.0001
0.0000
10
100
1000
Size

4.) From the performance plots, the point where Quicksort starts to outperform Bubble Sort varies across different cases.

- Best case scenario: Quicksort became faster at n = 30
- Worst case scenario: Quicksort became faster at n = 20
- Average case scenario: Quicksort became faster at n = 30

Additionally, after testing across multiple input sizes that for n > 1000, Bubble sort's execution timing increased dramatically, which follows the expected O(n^2) complexity. Meanwhile Quicksort maintained near-linear performance making it more effect for larger datasets. So, anything above 1000 was considered large and makes bubble sort impractical.