Q1 Report

Quicksort Pseudocode

```
Quicksort(Array, Lower_Index, Uppoer_Index)
       If (Lower_Index < Upper_Index) Then
               Pivot = Partition(Array, Lower_Index, Upper_Index)
               Quicksort(Array, Lower_Index, Pivot – 1)
               Quicksort(Array, Pivot, Upper_Index)
       Return Array
Partition(Array, Lower_Index, Upper_Index)
       Pivot = Array[(Lower_Index + Upper_Index)/2]
       L = Lower_Index
       R = Upper_Index
       While (l <= r) Then
               While (Array[L] < pivot) Then
                      L ++
               While(Array[R] > pivot) Then
                      R—
               If (L <= R) Then
                      Temp = Array[L]
                      Array[L] = Array[R]
                      Array[R]= Temp
                      L++
                      R—
       Return L
```

Terminal Screenshots

[28898, 247776, 71411, 281752, 217952, 417517, 22402, 463219, 175833, 285988, 407588, 477894, 495816, 106761, 144322, 56693, 135755, 228709, 44799, 476971, 72747, 486442, 486527, 366311, 435371, 89452, 337768, 238113, 181571, 297671, 15166, 151752, 339983, 186419, 22734, 365119, 265129, 39763, 356131, 16199, 460553, 18198, 52673, 36673, 19680, 37573, 366831, 16199, 460553, 18198, 366848, 377494, 1691154, 325549, 465986, 199122, 486608, 388688, 449611, 299819, 161158, 436141, 436249, 141448, 444228, 387141, 162839, 37788, 74599, 427709, 72643, 436139, 529512, 351149, 341149, 37749, 377416, 2812306, 408811, 404405, 13937, 188806, 405641, 243788, 29680, 236567, 22202, 144819, 135539, 34698, 169577, 18306, 497516, 163535, 409138, 361407, 359041, 375416, 2812306, 408811, 404405, 13937, 188806, 405641, 243788, 296806, 236567, 22202, 144819, 315399, 129225, 58695, 418829, 146254, 368249, 144184, 444228, 387144, 162839, 37788, 74599, 427707, 37804, 37853, 346477, 359041, 375416, 2812306, 408811, 404405, 13937, 188806, 405641, 243788, 296806, 236567, 22201, 434819, 315399, 129225, 58695, 418829, 146254, 368249, 144184, 444728, 344814, 76453, 58693, 129224, 148249, 146254, 384629, 144184, 444728, 344814,

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Saturday

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Sunday

Sunday

(2010b) 1107B, 1810B, 20221, 2018B, 1810Z, 21146, 1902B, 2122B, 1800B, 2016L, 4071B, 1802T, 5000C, 4078B, 4888B, 1810Z, 5180C, 380CA, 1807B, 180CA, 180CA,

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QuickSort Efficiency Test

Quicksort Efficiency

Monday a sorted List will tak 0 milliseconds to sort. Monday a random list will take 0 milliseconds to sort. Monday a reverse list will take 0 milliseconds to sort. Tuesday a sorted List will tak 0 milliseconds to sort. Tuesday a random list will take 0 milliseconds to sort. Tuesday a reverse list will take 0 milliseconds to sort. Wednesday a sorted List will tak 1 milliseconds to sort. Wednesday a random list will take 1 milliseconds to sort. Wednesday a reverse list will take 0 milliseconds to sort. Thursday a sorted List will tak 8 milliseconds to sort. Thursday a random list will take 8 milliseconds to sort. Thursday a reverse list will take 3 milliseconds to sort. Friday a sorted List will tak 12 milliseconds to sort. Friday a random list will take 12 milliseconds to sort. Friday a reverse list will take 5 milliseconds to sort. Saturday a sorted List will tak 17 milliseconds to sort. Saturday a random list will take 17 milliseconds to sort. Saturday a reverse list will take 8 milliseconds to sort. Sunday a sorted List will tak 218 milliseconds to sort. Sunday a random list will take 222 milliseconds to sort. Sunday a reverse list will take 87 milliseconds to sort.

Q1_D Hybrid Sorting Report

When deciding the second sorting method for my hybrid sort one of my main concerns was the case time complexity of the other sorting option for the reason I decided to use Insertion Sort. Insertion Sort had a case time complexity N when the list was sorted, and as a quicksort algorithm was going to be run on it before it was applied this meant that I believed it would perform the best. However from the efficiency test seen below, it is only seen to outperform the quicksort algorithm in the largest list, potentially showing its use on larger data sets. Initially, the algorithm would run against the whole ArrayList once a certain partition length was made, I had to modify it so it would only run on that partition however, another choice which had an impact is the partition size in which the partition would work on, too large and it would significantly reduce speed, whereas too small would make it essentially pointless, after changing the partition width I found 15 to although not be the greatest overall speed, it is where the fastest speeds were in the largest list.

Hybrid Efficiency

Monday a sorted List will tak 0 milliseconds to sort. Monday a random list will take 0 milliseconds to sort. Monday a reverse list will take 0 milliseconds to sort. Tuesday a sorted List will tak 0 milliseconds to sort. Tuesday a random list will take 0 milliseconds to sort. Tuesday a reverse list will take 0 milliseconds to sort. Wednesday a sorted List will tak 1 milliseconds to sort. Wednesday a random list will take 1 milliseconds to sort. Wednesday a reverse list will take 0 milliseconds to sort. Thursday a sorted List will tak 10 milliseconds to sort. Thursday a random list will take 9 milliseconds to sort. Thursday a reverse list will take 4 milliseconds to sort. Friday a sorted List will tak 16 milliseconds to sort. Friday a random list will take 16 milliseconds to sort. Friday a reverse list will take 6 milliseconds to sort. Saturday a sorted List will tak 26 milliseconds to sort. Saturday a random list will take 26 milliseconds to sort. Saturday a reverse list will take 11 milliseconds to sort. Sunday a sorted List will tak 170 milliseconds to sort. Sunday a random list will take 170 milliseconds to sort. Sunday a reverse list will take 63 milliseconds to sort.