Question-1:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| n |  |  |  |  |  |
|  | 921.03 | 13815.51 | 184206.81 | 2302585.09 | 27631021.12 |
|  |  |  |  |  |  |
| Average running time of Quick Sort | 157.109 | 2.368 | 44.036 | 716.627 | 7.298 |
| Average running time of Randomized Quick Sort | 229.914 | 2.847 | 33.165 | 548.215 | 8.730 |
| Average no. of comparisons during Quick Sort | 401.0 | 6450.0 | 75952.0 | 1041672.0 | 13279422.0 |
| Average no. of comparisons during Randomized Quick Sort | 390.15 | 6196.64 | 84531.34 | 1073807.25 | 13046259.98 |
| Average value of double sort time by Quick Sort | 1213.45 | 101.13 | 16686.46 | 182539.76 | 1841.07 |
| Average value of double sort time by Randomized Quick Sort | 429.32 | 5.23 | 64.99 | 1094.50 | 17.86 |

Qusetion-2:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| n |  |  |  |  |  |
|  |  |  |  |  |  |
| Average running time of Quick Sort | 157.109 | 2.368 | 44.036 | 716.627 | 7.298 |
| Average running time of Merge Sort | 288.634 | 3.989 | 56.841 | 963.512 | 13.407 |
| Average no. of comparisons during Quick Sort | 401.0 | 6450.0 | 75952.0 | 1041672.0 | 13279422.0 |
|  | 921.03 | 13815.51 | 184206.81 | 2302585.09 | 27631021.12 |
| Average no. of comparisons during Merge Sort | 1564.0 | 23988.0 | 323248.0 | 4065667.0 | 48903806.0 |
|  | 1328.77 | 19931.57 | 265754.25 | 3321928.09 | 39863137.14 |
| Number of times Merge Sort outperformed Quick Sort | 8 | 9 | 95 | 116 | 42 |

Question-3:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| n |  |  |  |  |  |
|  |  |  |  |  |  |
| Average running time of Randomized quick sort | 229.914 | 2.847 | 33.165 | 548.215 | 8.730 |
|  | 921.03 | 13815.51 | 184206.81 | 2302585.09 | 27631021.12 |
| Average no. of comparisons during Randomized Quick Sort | 390.15 | 6196.64 | 84531.34 | 1073807.25 | 13046259.98 |
| No. of cases where run time exceeds average by 5% |  |  |  |  |  |
| No. of cases where run time exceeds average by 10% |  |  |  |  |  |
| No. of cases where run time exceeds average by 20% |  |  |  |  |  |
| No. of cases where run time exceeds average by 30% |  |  |  |  |  |
| No. of cases where run time exceeds average by 50% |  |  |  |  |  |
| No. of cases where run time exceeds average by 100% |  |  |  |  |  |