**COMP 301**

**Analysis of Algorithms**

**Lab 10 Report**

b) Array before quick sort: [47, 39, 89, 92, 55, 83, 74, 64, 5, 20]

Array after quick sort: [5, 20, 39, 47, 55, 64, 74, 83, 89, 92]

c)

|  |  |  |  |
| --- | --- | --- | --- |
| Input size | Quick Sort Running Time | Heap Sort Running Time | Merge Sort Running Time |
| 4 | 7800 | 358300 | 15600 |
| 64 | 89700 | 135300 | 99000 |
| 256 | 609400 | 102600 | 8279700 |
| 1024 | 11078100 | 599800 | 659100 |
| 4096 | 2413800 | 1906000 | 3245200 |
| 16384 | 12172900 | 7007100 | 8482200 |
| 65536 | 67136800 | 18371800 | 18287800 |
| 262144 | 812789900 | 51167200 | 60593000 |
| 1048576 | Stack Overflow | Stack Overflow | Stack Overflow |
| 4194304 | Stack Overflow | Stack Overflow | Stack Overflow |
| 16777216 | Stack Overflow | Stack Overflow | Stack Overflow |
| 67108864 | Stack Overflow | Stack Overflow | Stack Overflow |

d)

|  |  |  |  |
| --- | --- | --- | --- |
| Input size | Quick Sort RAM | Heap Sort RAM | Merge Sort RAM |
| 67108864 | 290,068 | 329,936 | 1,137,832 |

According to the table, the memory usage is the highest for merge sort and the lowest for quick sort. The reason for merge sort to use the maximum amount of memory is that it requires a temporary array to merge the sorted arrays.