

QUESTION 1 :

MERGE SORT USING PROCESS AND THREADS:

Running normal merge sort, process merge sort and thread merge sort we get the following output:

```
enter the number of elements of array
7
enter the array elements
9 87 56 39 23 100 3
executing normal merge sort
the sorted array is :
3 9 23 39 56 87 100
time = 0.000186
executing merge sort as a process
the sorted array is :
3 9 23 39 56 87 100
time = 0.004561
executing merge sort using threads
the sorted array is :
3 9 23 39 56 87 100
time = 0.030809
normal_quicksort ran:
[ 0.006027 ] times faster than concurrent_quicksort
[ 0.148035 ] times faster than threaded_concurrent_quicksort
```

Here we can see that standard/normal merge sort is fastest followed by thread merge sort. Process merge sort is the slowest among all.

Standard/normal merge sort is the fastest as there is no new process or thread created.

Thread merge sort is faster than process merge sort as threads run in parallel unlike process merge sort where we have to wait for one process to end before a new process can be started.