

# Report for Assignment 4

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## 1 Triplicates

Linearithmic time is the same as  $O(n * \log(n))$ . My algorithm performs two binary search calls for each of the arrays to be searched. In the worst case it is  $2n * \log(n)$  time.

## 2 Cutoff Quicksort

I didn't really come to a conclusion for what the best *Mvalue* for my machine is. I conducted experiments for varying value for  $N$  with three trials per *Mvalue* test. My data is in the tables on the following pages.

M value #	Runtime
0	0.00600
1	0.00467
2	0.00400
3	0.00367
4	0.00433
5	0.00433
6	0.00267
7	0.00233
8	0.00233
9	0.00233
10	0.00200
11	0.00133
12	0.00033
13	0.00067
14	0.00000
15	0.00033
16	0.00033
17	0.00067
18	0.00000
19	0.00033
20	0.00000
21	0.00033
22	0.00000
23	0.00167
24	0.00033
25	0.00000
26	0.00033
27	0.00033
28	0.00000
29	0.00000
30	0.00033
For N = 1000, the best M value was: 14	

M value #	Runtime
0	0.00667
1	0.00500
2	0.00400
3	0.00400
4	0.00300
5	0.00233
6	0.00267
7	0.00233
8	0.00200
9	0.00200
10	0.00200
11	0.00200
12	0.00200
13	0.00200
14	0.00200
15	0.00200
16	0.00200
17	0.00200
18	0.00200
19	0.00200
20	0.00200
21	0.00233
22	0.00200
23	0.00200
24	0.00200
25	0.00200
26	0.00200
27	0.00200
28	0.00200
29	0.00200
30	0.00233
For N = 10000, the best M value was: 8	

M value #	Runtime
0	0.03300
1	0.03167
2	0.03067
3	0.03100
4	0.03067
5	0.03100
6	0.03100
7	0.02967
8	0.03033
9	0.03000
10	0.03000
11	0.02933
12	0.02967
13	0.02967
14	0.03000
15	0.02967
16	0.03000
17	0.02967
18	0.02967
19	0.02967
20	0.03033
21	0.02967
22	0.02967
23	0.02967
24	0.03000
25	0.02933
26	0.03067
27	0.02967
28	0.03000
29	0.03000
30	0.03000
For N = 100000, the best M value was: 11	

M value #	Runtime
0	0.58900
1	0.58367
2	0.58933
3	0.58300
4	0.58433
5	0.61067
6	0.57167
7	0.56833
8	0.57067
9	0.57333
10	0.56000
11	0.56267
12	0.56933
13	0.55867
14	0.56300
15	0.56100
16	0.56067
17	0.56133
18	0.55733
19	0.57433
20	0.57233
21	0.56900
22	0.56467
23	0.56333
24	0.57567
25	0.55700
26	0.56633
27	0.56467
28	0.57200
29	0.56400
30	0.56567
For N = 1000000, the best M value was: 25	