q1.

To obtain higher accuracy, each algorithm is done 10 times in the loop while time counting. With 5 trials.

Alg1

|  |
| --- |
| 100000  1: 15ms, 2: 19ms 3: 20ms 4: 17ms 5: 14ms  avg:17ms/10 = 1.7  1000000 |

Alg2

|  |
| --- |
| 100000  12,11,11,12,12  Avg:11.6ms/10 = 1.16 |

Alg3

|  |
| --- |
| 100000  52,52,55,59,52  Avg:54/10 = 5.4 |

### Further results

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| N | Case 1 | case2 | case3 | Log(N) | Log^2(N) |
| 100000 | 1.7 | 1.16 | 5.4 | 5 | 25 |
| 1000000 | 14.6 | 5.36 | 109.22 | 6 | 36 |
| 5000000 | 78.68 | 23.34 | 989.48 | 6.69897000433602 | 44.8761991189937 |

### Performance:

Alg2>Alg1>Alg3

Alg1,2 are sub-linear and Alg3 is O(n).

While Alg1 and Alg2 are using Euler Sieve algorithm for faster screening, Alg3 is a primitive algorithm that test each no’s primeness by quotients less than sqrt(itself), this explains the performance difference.