**Experimental Analysis**

**ALGORITHM 1**

**1)**

|  |  |
| --- | --- |
| Enumerative | |
| N | Time |
| 20 | 0.00008 |
| 50 | 0.000587 |
| 100 | 0.003105 |
| 200 | 0.018828 |
| 300 | 0.052911 |
| 500 | 0.215364 |
| 1000 | 1.461163 |
| 1200 | 2.596658 |
| 1500 | 4.956266 |
| 2000 | 11.66336 |

**2)**

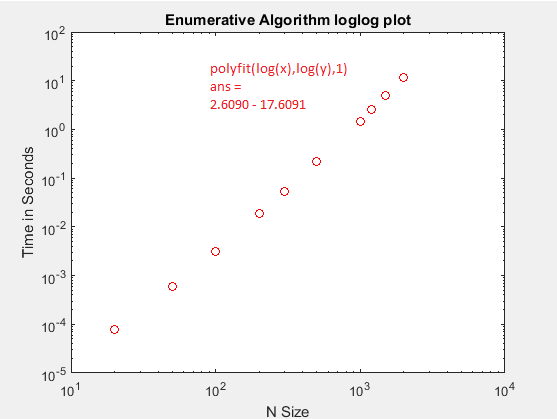
3)

4)

5)

10 minutes = 600 seconds, so I took 600 seconds and set it equal to 1E-09x3 + 4E-08x2 + 3E-05x + 5E-05, and plugged this into Wolfram Alpha. The result was x = 8419.8. So the greatest size of N that could be solved using this algorithm in 10 minutes would be roughly 8419.6.

6)



slope = 2.6090

**ALGORITHM 2**

**1)**

|  |  |
| --- | --- |
| Iterative | |
| N | Time |
| 20 | 0.0000256 |
| 50 | 0.0001441 |
| 100 | 0.0003382 |
| 200 | 0.0012358 |
| 300 | 0.0024545 |
| 500 | 0.0081496 |
| 1000 | 0.0295787 |
| 1200 | 0.0410674 |
| 1500 | 0.0622348 |
| 2000 | 0.1161804 |

**2)**

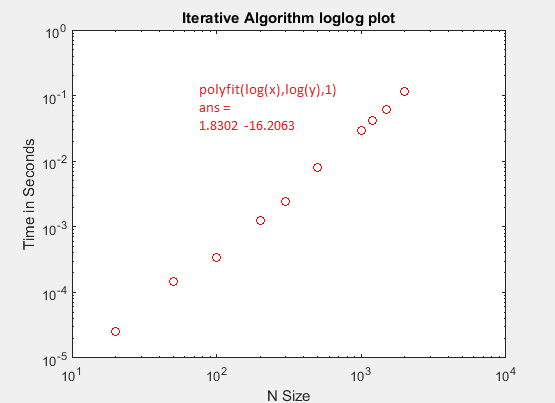
**3)**

**4)**

**5)**

Using Wolfram Alpha, I set 600 = 3E-08x2 - 1E-06x + 0.0003. The result was x = 141,438. So the greatest value of N this algorithm could solve in 10 minutes is roughly 141,438.

**6)**

slope = 1.8302

**ALGORITHM 3**

**1)**

|  |  |
| --- | --- |
| Divide & Conquer | |
| N | Time |
| 20 | 0.00006 |
| 50 | 0.000169 |
| 100 | 0.000487 |
| 200 | 0.001543 |
| 300 | 0.003079 |
| 500 | 0.007769 |
| 1000 | 0.030524 |
| 1200 | 0.043727 |
| 1500 | 0.070405 |
| 2000 | 0.127336 |

**2)**

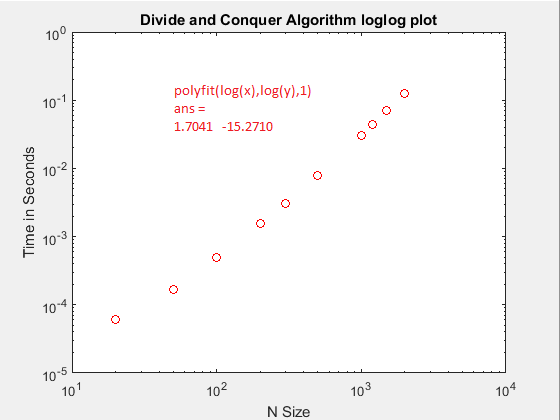
**3)**

**4)**

**5)**

Using Wolfram Alpha, we plugged in 600 = 6E-05x - 0.0113 and got x = 10,000,200. So in 10 minutes, the max value of N this algorithm could solve is around 10,000,200.

**6)**

slope = 1.7041

**ALGORITHM 4**

**1)**

|  |  |
| --- | --- |
| Linear | |
| N | Time |
| 20 | 0.000003 |
| 50 | 0.000005 |
| 100 | 0.00001 |
| 200 | 0.00001 |
| 300 | 0.00002 |
| 500 | 0.00003 |
| 1000 | 0.00007 |
| 1200 | 0.00008 |
| 1500 | 0.000116 |
| 2000 | 0.000169 |

**2)**

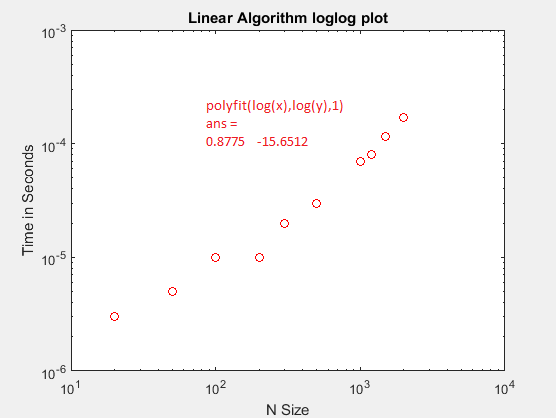
**3)**

**4)**

**5)**

Using Wolfram Alpha, we plugged in 600 = 8E-08x - 4E-06 and got x = 7,500,000,050. So in 10 minutes, the max value of N this algorithm could solve is around 7,500,000,050.

**6)**

slope = .8775

**7)**

**Plot of all four algorithms together**