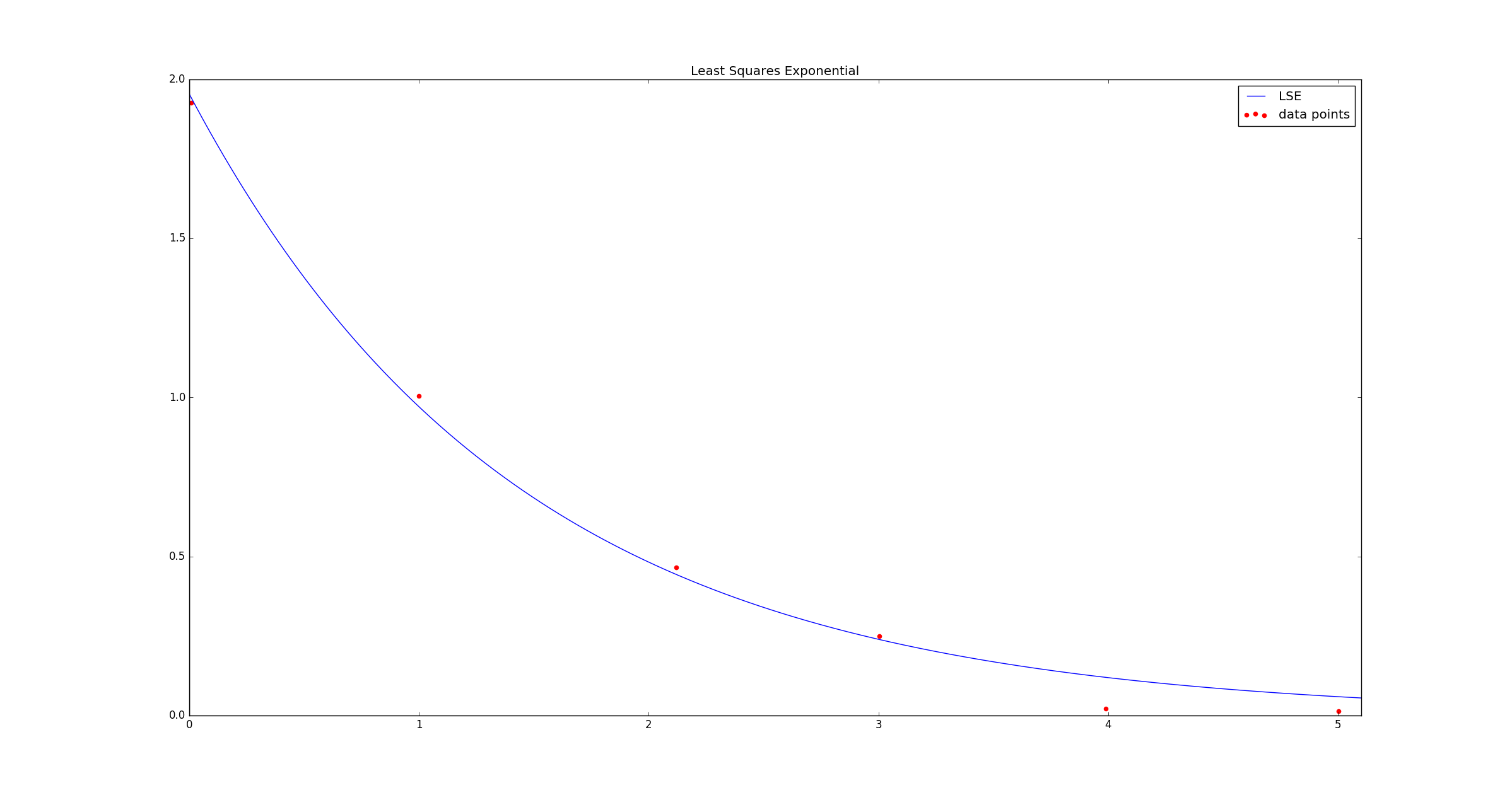
Problem 2  
  
Since we are given a discrete set of data points and are tasked with finding the least squares exponential, we use the nonlinear system (letting *a* be positive to simplify some calculations)

,where , to find the coefficients a and b. Both equations are set to zero to find their minimum. To solve this, we use Newton’s Method, which requires the following equations:  
  
 Then we apply Newton’s method to solve:  
  
   
  
until necessary. We choose the initial guess to be *a = 0.72005416*, *b = 2.1450464*. We got these values by solving the system   
  
   
  
by first substituting for *b*. Table 1 shows the values of *a* and *b* when applying Newton’s Method.

| ***a*** | ***b*** | ***f1(a, b)*** | ***f2(a, b)*** |
| --- | --- | --- | --- |
| -0.698308785055 | 1.9524134382 | 0.00426806347043 | -0.00491427954298 |
| -0.699939809444 | 1.95535180212 | 1.55988397904e-05 | 2.83425536939e-06 |
| -0.699942841078 | 1.95535266987 | 1.44420163328e-10 | 3.36833824721e-11 |
| -0.699942841105 | 1.95535266987 | -3.05311331772e-16 | -5.13478148889e-16 |
| -0.699942841105 | 1.95535266987 | 6.24500451352e-17 | 7.329206686e-17 |

 Table 1. Successive iterations of Newton’s Method.  
  
  
After five iterations, we get *a = -0.69994284110*, *b = 1.95535266987*. accurate to the decimal places shown. Thus, the least squares exponential is:  
  
 .  
  
The sum of the squared errors is 0.01376077449.