In this problem we have a biexponential model.

$$x(t) = Ae^{-t/\tau_1} + Be^{-t/\tau_2},$$

with 4 fitting parameters A, τ_1, B & τ_2

Here, least square method was used to find the fit values of A, τ_1, B and τ_2

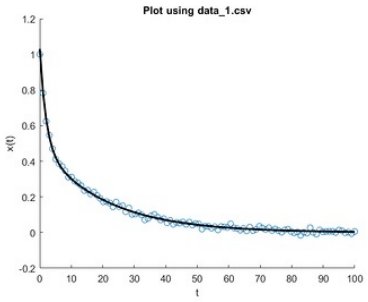
$$\chi^2 = \sum_i \frac{1}{\sigma_i^2} \left[F(t_i) - x_i\right]^2$$

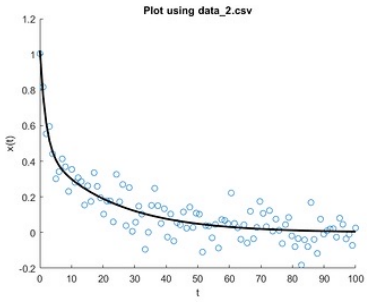
Here, σ_i = standard deviation

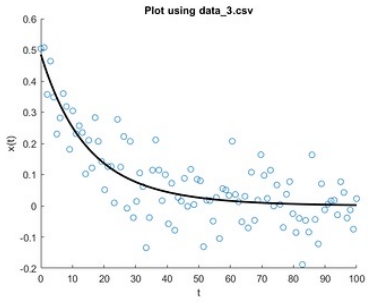
$F(t_i) \rightarrow$ fitting function, which in this case is $Ae^{-t/\tau_1} + Be^{-t/\tau_2}$

$x_i \rightarrow$ observed x at timestep t_i

We first minimize the squared error. MATLAB doesn't have a single function that performs a least squared search. So, we had to define a function to do it by defining lsquares (squared error between data & fit) and using the "fminsearch" to minimize that.







And after fitting the datasets in the biexponential model, the above shown graphs were produced.

I used the initial condition

$$A = 10,\ \tau_1 = 5,\ B = 100,\ \tau_2 = 50$$

while trying out different values as initial conditions it's noticed that change τ_2 has the greatest impact on the bi exponential model. Then, τ_1 has the bigger impact than the rest.