Case study 1

In an experiment with the protozoan para medium biologist G F Gause found the daily count of the population of protozoa growth as given in the table. Find the exponential model for the Gause’s data given below.Compare the predicted values with the observed values and comment on the fit.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| t (days) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| P (Observed) | 2 | 3 | 22 | 16 | 39 | 52 | 54 | 47 | 50 | 76 | 69 | 51 | 57 | 70 | 53 | 59 | 57 |

{Note: Gauss assumed the relative growth rate k = 0.7944)

{Hint: , where *k* is the constant of proportionality and is referred as relative growth rate}

1. Solve the problem manually to find the general solution only, and insert its image in wxmaxima
2. Solve the problem using Maxima to find the general solution, by maintaining *k* as unknown.
3. Substitute the value of the k as 0.7944 and express the general solution.
4. Give the plot of the given data and the general solution obtained through exponential model and comment on the result.