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Assignment 4

Given that $\frac{dy}{dt} \propto y$ where y = number of bacteria, t = time.

$\frac{dy}{dt} = Ky$ (Integrating both sides)

$\int \frac{dy}{dt} = \int Ky \rightarrow \ln y = Kt + C \rightarrow y = e^{Kt+C} \rightarrow y = e^{Kt} \cdot e^{C}$

Let $e^{C} = y_0$ i.e initial number of bacteria.

$y = y_0 e^{Kt}$

It should be noted that the bacteria triples population every 9hours

Hence, $\frac{y}{y_0} = 3$ when $t = 9$

Case A: $y_0 = 50$ $\frac{y}{y_0} = 3$ when $t = 9$ $\frac{y}{y_0} = e^{Kt}$

$3 = e^{9K}$; $K = \frac{\ln 3}{9} = 0.122$

Hence for Case A $y = y_0 e^{Kt} \rightarrow y(t) = 50e^{0.122t}$ → 1

Case B: $y_0 = 150$ $\frac{y}{y_0} = 3$ when $t = 9$ $\frac{y}{y_0} = e^{Kt}$

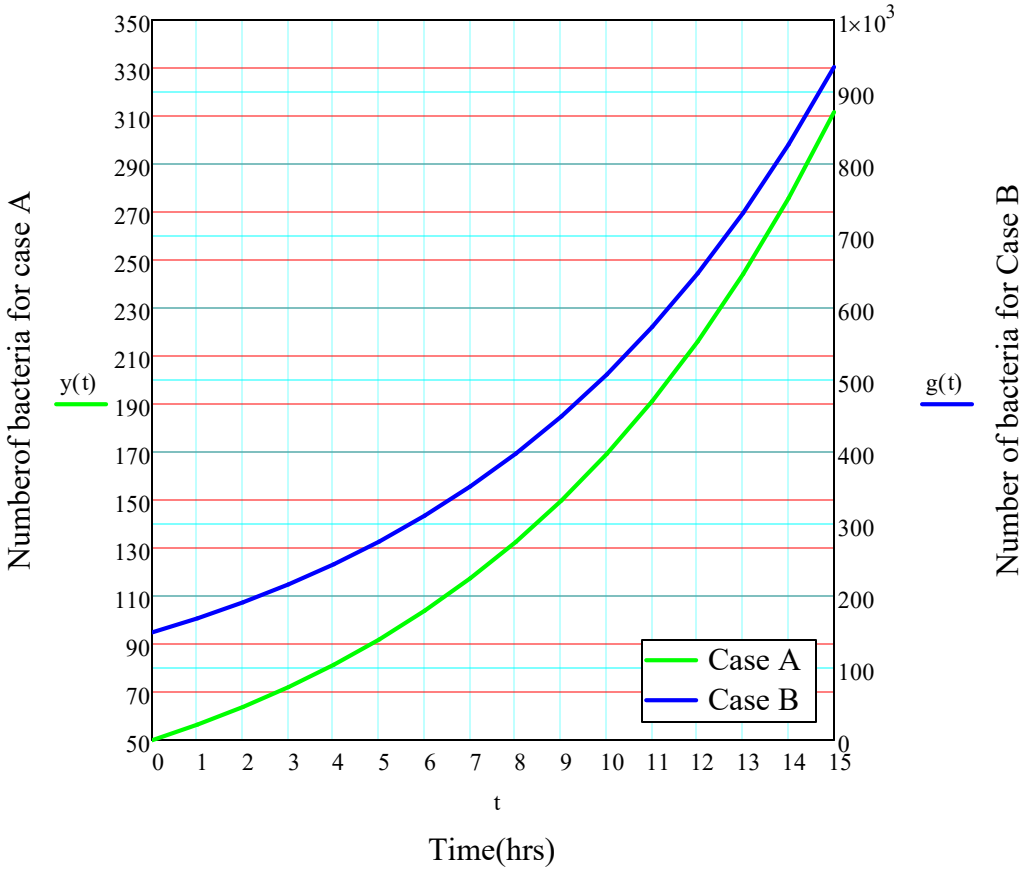
$3 = e^{Kt}$; $K = \frac{\ln 3}{9} = 0.122$

Hence for Case B $y = y_0 e^{Kt} \rightarrow y(t) = 150e^{0.122t}$

$t := 0, 1 .. 15$

$y(t) := 50e^{0.122t}$

$g(t) := 150e^{0.122t}$



Time(hrs)

Nunber Of Bacteria versus Time