

## Assignment

$$\frac{dy}{dt} = ky$$

$$\frac{dy}{y} = k dt$$

$$\frac{y}{y_0} = 3$$

$$\int \frac{dy}{y} = \int k dt$$

$$\ln y = kt + C$$

$$y = e^{kt+C} = e^{kt} \times e^C$$

Case A  $\rightarrow y = e^{kt} = 3$  at  $t = 9$

Case B  $\rightarrow y = e^{kt} = 9$  at  $t = 18$

$$y_0 = e^C$$

$$\therefore y = y_0 e^{kt}$$

For Case A

$y \neq$  The number of bacteria at  $t = 0$  is 50

$$\therefore 50 = y_0 e^{k(0)}$$

$$50 = y_0 \cdot 1$$

$$y_0 = 50 \dots (1)$$

$$\therefore y = 50e^{kt} \dots (2)$$

For Case B

The number of bacteria at  ~~$t = 0$~~  is  ~~$150 \times 3 = 150$~~  = 150

$$\therefore 150 = y_0 e^{k(0)}$$

$$150 = y_0 \cdot 1$$

$$y_0 = 150 \dots (3)$$

$$y = 150e^{kt} \dots (4)$$

For Case A  $\therefore 3 = e^{kt}$

$$\ln 3 = kt$$

$$\ln 3 = 9k$$

$$k = \frac{\ln 3}{9} = 0.122$$

For Case B  $\therefore 9 = e^{kt}$

$$\ln 9 = 18k$$

$$\frac{\ln 9}{18} = k$$



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

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

$$t := 0, 1..15$$

t =

0
1
2
3
4
5
6
7
8
9
10
11

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Mathcad symbols:  $\int$ ,  $\frac{d}{dx}$ ,  $\alpha$ ,  $\beta$

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Mathcad symbols:  $x_n$ ,  $x^{-1}$ ,  $f(t)$ ,  $M^T$ ,  $M^T$ ,  $m \dots n$ ,  $\sum$

Mathcad symbols:  $\frac{d}{dx}$ ,  $\frac{d^2}{dx^2}$ ,  $\frac{d^3}{dx^3}$

Mathcad symbols:  $=$ ,  $:=$ ,  $\equiv$ ,  $\rightarrow$ ,  $\bullet \rightarrow$ ,  $f_x$ ,  $x_f$ ,  $x_{fy}$ ,  $x^f_y$

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

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

t := 0, 1.. 15

t =

0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

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Go

$x_n$   $x^{-1}$   $|x|$   $f(x)$   $M^T$   $M^T$   $m..a$   $\hat{m}$   $\hat{r}$   $\hat{r}x\hat{r}$   $\Sigma v$

$=$   $::$   $\equiv$   $\rightarrow$   $\bullet\rightarrow$   $f_x$   $x_f$   $x_f y$   $x^f y$

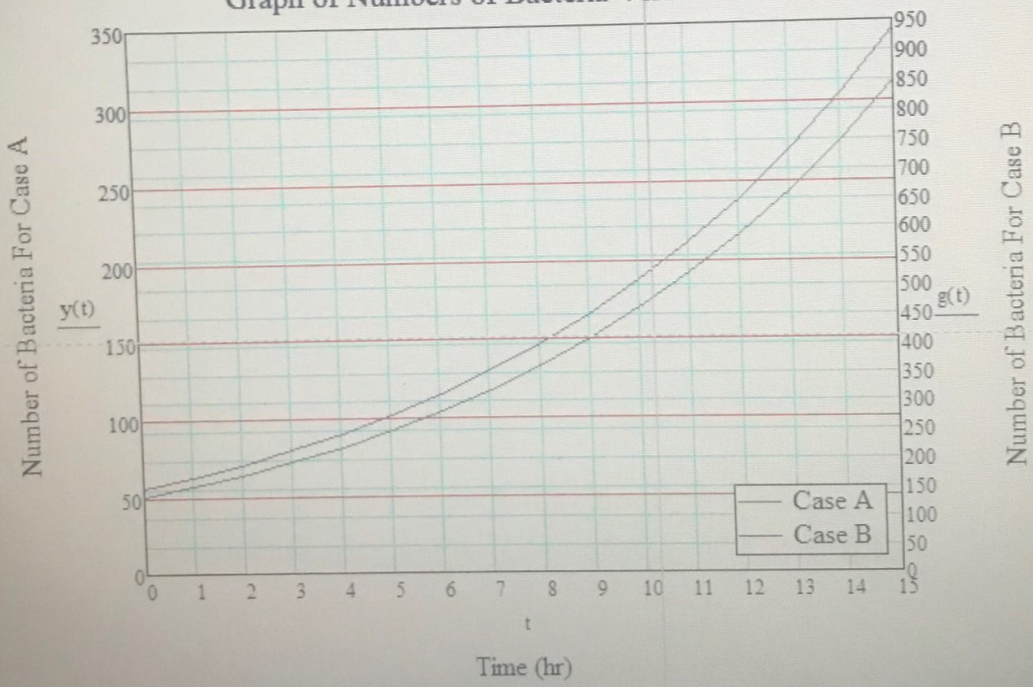
$y(t) =$

50
56.488
63.817
72.098
81.453
92.022
103.962
117.451
132.691
149.908
169.359
191.334
216.161
244.209
275.896
311.694

$g(t) =$

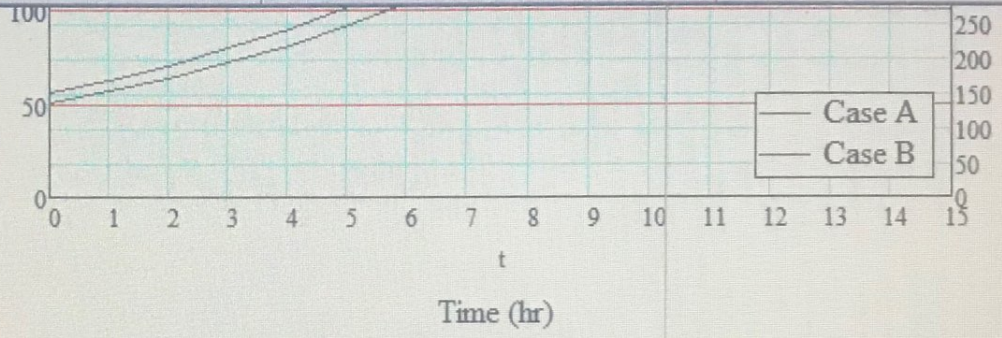
150
169.463
191.452
216.202

Graph of Numbers of Bacteria Versus Time



210.101
244.209
275.896
311.694

Num



g(t) =

150
169.463
191.452
216.293
244.358
276.065
311.885
352.354
398.073
449.725
508.078
574.003
648.483
732.626
827.687
935.083