

Toby Andrew - ka
Petroleum Eng
200/201
ENG 282

Solution

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

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

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

$$\ln y = kt + C$$

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

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

$$y_0 = e^C$$

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

for case A

Initial number of bacteria at $t=0$

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

$$50 = y_0 \cdot 1$$

$$\therefore y_0 = 50$$

$$\therefore y = 50 e^{kt}$$

Number of bacteria at $t=9$ hrs is $50 \times 3 = 150$

$$y = 50 e^{k(9)}$$

$$y = 50 e^{9k}$$

$$150 = 50 e^{9k}$$

$$e^{9k} = \frac{150}{50}$$

$$e^{9k} = 3$$

$$9k = \ln 3$$

$$9k = 1.0986$$

$$k = \frac{1.0986}{9}$$

$$k = 0.122$$

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

$$y_t = 50 e^{0.122(t)}$$

Case A

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

case B

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

Initial number at $t=0$ is 150

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

$$150 = y_0 \cdot 1$$

$$\therefore y_0 = 150$$

$$150 \times 3 = 450$$

$$450 = 150 e^{k(9)}$$

$$e^{9k} = \frac{450}{150} = 3$$

$$e^{9k} = 3$$

$$9k = \ln 3$$

$$9k = 1.0986$$

$$k = \frac{1.0986}{9}$$

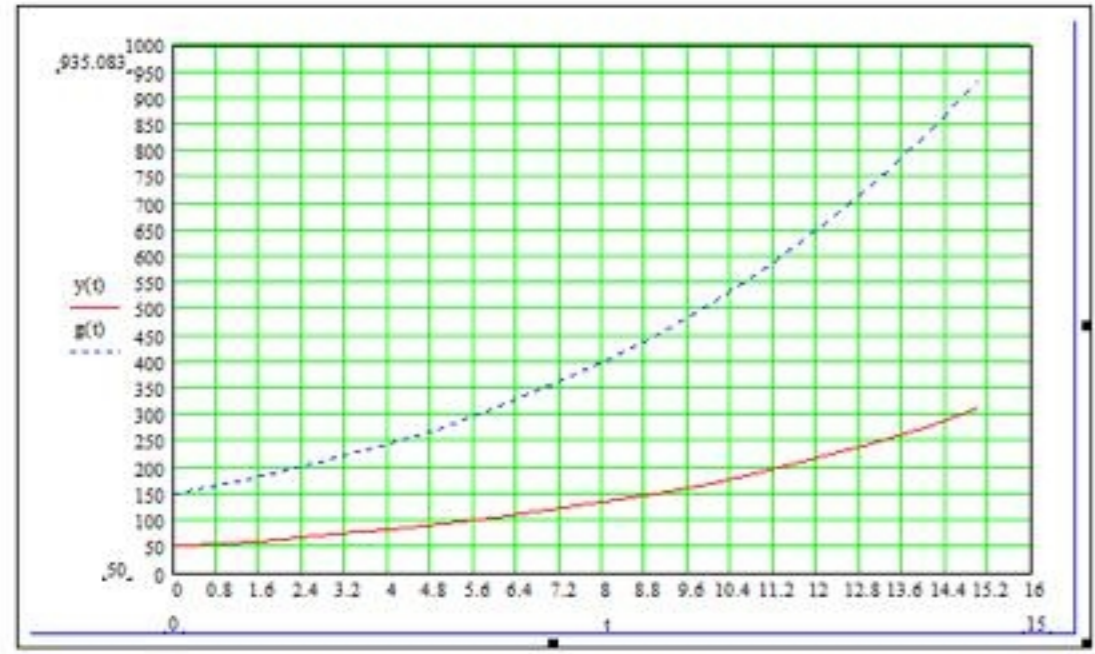
$$k = 0.122$$

for Case B

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

Normal Arial 10 B / U

6	103.962	311.885
7	117.451	352.354
8	132.691	398.073
9	149.908	449.725
10	169.359	508.078
11	191.334	574.003
12	216.161	648.483
13	244.209	732.626
14	275.896	827.687
15	311.694	935.083



Calculator

nl i π x_n $|x|$
 ln e^x x^{-1} x^y $n^{\sqrt{\quad}}$
 log π () x^2 $\sqrt{\quad}$
 tan 7 8 9 /
 cos 4 5 6 \times
 sin 1 2 3 +
 = . 0 - =

Math

\int $\frac{d}{dx}$ \sum
 $x =$ \int $<$ $>$
 α β γ

Matrix

$\begin{bmatrix} \dots \\ \dots \\ \dots \end{bmatrix}$ x_n x^{-1} $|x|$
 $f(t)$ m^2 m^r $m..a$
 $E \cdot T$ $E \cdot x^T$ $\otimes U$ \otimes

Graph

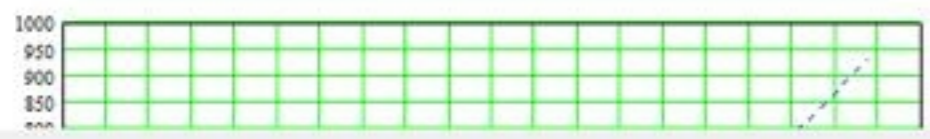
\int $\frac{d}{dx}$ \sum
 \int $\frac{d}{dx}$ \sum
 \int $\frac{d}{dx}$ \sum

Normal Arial 10 B I U

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PETROLEUM ENGINEERING

$t := 0, 1..15$ $y(t) := 50 \cdot e^{0.122 \cdot (t)}$ $g(t) := 150 \cdot e^{0.122 \cdot (t)}$

t =	y(t) =	g(t) =
0	50	150
1	56.488	169.463
2	63.817	191.452
3	72.098	216.293
4	81.453	244.358
5	92.022	276.065
6	103.962	311.885
7	117.451	352.354
8	132.691	398.073
9	149.908	449.725
10	169.359	508.078
11	191.334	574.003
12	216.161	648.483
13	244.209	732.626
14	275.896	827.687
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Calculator

nl i m x_n |x|
ln e^x x⁻¹ x^y n[√]
log π () x² √
tan 7 8 9 /
cos 4 5 6 ×
sin 1 2 3 +
:= . 0 - =

Math

x = [] < >
α β ∫

Matrix

[] x_n x⁻¹ |x|
f(t) n² n^r m.n
E · T ExT ∂u

Graph

Line Circle Polygon
Pie Chart Area Chart
Bar Chart Scatter Plot