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MATRIC NO: 18/ENG08/005
BIOMEDICAL ENGINEERING
ENG 282

Let Case A = $y_1 = 50$
Let Case B = $y_1 = 150$

For Case A, $y_2 = y_1 e^{kt}$

$e^{kt} = 3$

$y_2 = y_1 \cdot 3$

$\therefore \frac{y_2}{y_1} = 3$ (at $t = 9$hrs)

for Case B, $y_2 = y_1 e^{kt}$

$e^{kt} = 9$

$y_2 = y_1 \cdot 9$

$\therefore \frac{y_2}{y_1} = 9$ (at $t = 18$hrs)

Recall that, $y_1 = 50$

$y_1 = 150$

$\therefore$ for Case A, $y_2 = 50 e^{kt}$ ——— (1)

for Case B, $y_2 = 150 e^{kt}$ ——— (2)

Considering Case A, recall $e^{kt} = 3$

when $t = 9$

$\therefore kt = \ln 3$

$k \cdot 9 = \ln 3$

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

$k = 0.122$ ——— (3)

Considering Case B, recall $e^{kt} = 9$

when $t = 18$

$\therefore kt = \ln 9$

$k \cdot 18 = \ln 9$

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

$k = 0.122$ ——— (4)

Put the values of equation (3) & (4) into equation (1) & (2)

for Case A $y_1 = 50\, e^{0.122t}$

for Case B $y_2 = 150\, e^{0.122t}$

$t = 0, 1 .. 15$

$A(t) := 50 \cdot \exp(0.122 \cdot t)$

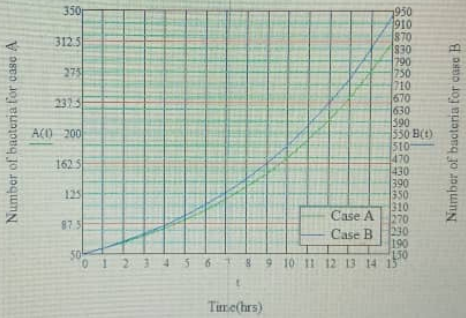
$B(t) := 150 \cdot \exp(0.122 \cdot t)$

$A(t) =$

| |
|---|
| 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 |

$B(t) =$

| |
|---|
| 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 |




Time(hrs)

Numbers of bacteria versus time

$t := 0,1..15$

$A(t) := 50 \cdot \exp(0.122 \cdot t)$

$B(t) := 150 \cdot \exp(0.122 \cdot t)$

$A(t) =$

| |
|---|
| 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 |

$B(t) =$

| |
|---|
| 150 |
| 169.463 |
| 191.452 |
| 216.293 |
| 244.358 |
| 276.065 |
| 311.885 |
| 352.354 |
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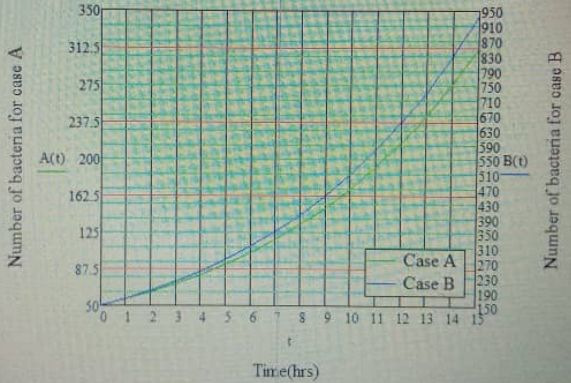


Numbers of bacteria versus time