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18/ENUG04/029
Elect - Elect

ENG 282

Engineering Mathematics II

$$y = y_0 e^{kt} \dots \textcircled{i}$$

$$z = z_0 e^{kt} \dots \textcircled{ii}$$

$$y = 3y_0 \dots \textcircled{iii}$$

$$3y_0 = y_0 e^{kt} \dots \textcircled{iv}$$

$$y_A = y_0 A e^{kt} \dots \textcircled{v}$$

$$y_0 A = 50 \dots \textcircled{vi}$$

$$y_A = 50 e^{kt} \dots \textcircled{vii}$$

At time $t = 9$ hrs

$$y_A = 50 e^{14t}$$

$$3 \times 50 = 50 e^{14 \times 9}$$

$$3 \times 50 = e^{126}$$

$$50$$

$$3 = e^{126/50}$$

$$\ln 3 = \ln e^{126/50}$$

$$1.0986 = \ln e^{126/50}$$

$$1.0986 = \frac{1.26}{50} \times 50$$

$$k = 0.122$$

Substituting k into (vi)

$$y_A = 50e^{0.122t}$$

For B

$$y_B = y_{0B} e^{kt} \dots \text{(vii)}$$

$$y_{0B} = 150 \dots \text{(viii)}$$

$$y_B = 150e^{kt} \dots \text{(ix)}$$

At time $t = 9$ hrs

$$y_B = 150e^{kt}$$

$$3 \times 150 = 150e^{k \times 9}$$

$$3 \times 150 = e^{k \times 9}$$

$$150$$

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

$$\ln 3 = k \times 9$$

$$1.0986 = k \times 9$$

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

$$k = 0.122$$

Substituting k into ix

$$y_B = 150e^{0.122t}$$

$t = 0, 1, \dots, 15$

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

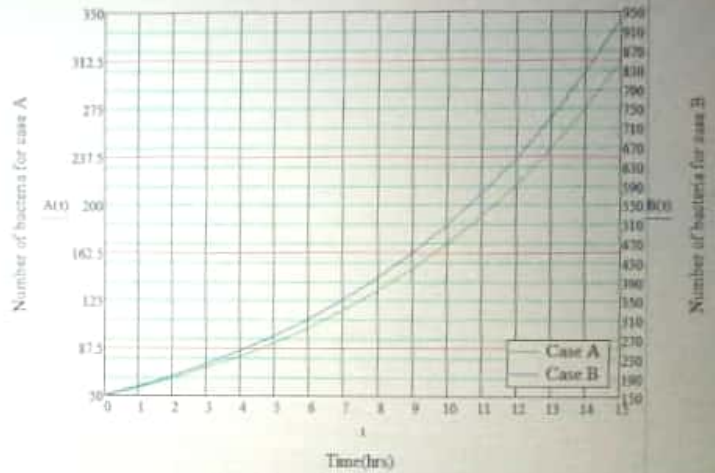
$B(t) = 150 \exp(0.122 t)$

$A(t) =$

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
935.082



Numbers of bacteria versus time