(1) If $y(t) = Ae^{kt}$ and we have $y(1) = 2$, and $y(2) = 3$, find A and k. Write $y(t)$ in the form $y(t) = Ab^t$. Then write it in the form $y(t) = A \cdot 2^{\frac{t}{d}}$. For what value of t_{100} do we have $y(t_{100}) = 100$? Solution

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$$y(t) = 2^{\frac{3+t}{2}}$$

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(3) If $y(t) = y_\infty + Ae^{kt}$ and we have $y(0) = 4$, $y(1) = 2.5$, and $y(2) = 1.75$, find y_∞, A and k. Solution

$$y(t) = 1 + 3 \cdot 2^{-t}$$

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Thus $y(t) = 2^{\frac{3}{2}} e^{\frac{\ln 2}{2} t} = 2^{\frac{3}{2}} 2^{\frac{t}{2}} = 2^{\frac{3}{2} + \frac{t}{2}} = 2^{\frac{3+t}{2}}$, so we have

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Finally, we solve $y(t_{25}) = 25$:

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If $y(t) = Ae^{kt}$ and we have $y(-1) = 2$, and $y(1) = 4$, find A and k. Write $y(t)$ in the form $y(t) = Ab^t$. Then write it in the form $y(t) = A \cdot 2^{\frac{t}{d}}$. For what value of t_{25} do we have $y(t_{25}) = 25$?

Back to Questions

Solution: Since $y(-1) = 2 = A^{k\cdot(-1)}$ and $y(1) = 4 = Ae^{k\cdot 1}$,

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$y(t_{25}) = t_{25}\frac{1}{2}\ln 2 = \ln 25 - \frac{3}{2}\ln 2$, and we have $t_{25} = \frac{2\ln 5 - \frac{3}{2}\ln 2}{\frac{1}{2}\ln 2} = \frac{4\ln 5 - 3\ln 2}{\ln 2}$

(3)

If $y(t) = y_\infty + Ae^{kt}$ and we have $y(0) = 4$, $y(1) = 2.5$, and $y(2) = 1.75$, find y_∞, A and k. Solution

$y(t) = 1 + 3 \cdot 2^{-t}$

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Solution: We have: Back to Questions

$$y(0) = 4 = y_\infty + Ae^{k \cdot 0}$$

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Solution: We have: Back to Questions

$$\begin{array}{llllll} y(0) = 4 = y_\infty + Ae^{k\cdot 0} & & 4 = y_\infty + A & & 4 - y_\infty = A \\ y(1) = 2.5 = y_\infty + Ae^{k\cdot 1} & \text{so we have} & \frac{5}{2} = y_\infty + Ae^{k} & \text{or} & \frac{5}{2} - y_\infty = Ae^{k} \\ y(2) = 1.75 = y_\infty + Ae^{k\cdot 2} & & \frac{7}{4} = y_\infty + Ae^{2k} & & \frac{7}{4} - y_\infty = Ae^{2k} \end{array}$$

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$\dfrac{Ae^k}{A} = \dfrac{\frac{5}{2} - y_\infty}{4 - y_\infty}$ and $\dfrac{Ae^{2k}}{Ae^k} = \dfrac{\frac{7}{4} - y_\infty}{\frac{5}{2} - y_\infty}$ which both equal e^k, so we have

$\dfrac{\frac{5}{2} - y_\infty}{4 - y_\infty} = \dfrac{\frac{7}{4} - y_\infty}{\frac{5}{2} - y_\infty}$ or $\left(\dfrac{5}{2} - y_\infty\right)^2 = (4 - y_\infty)\left(\dfrac{7}{4} - y_\infty\right)$ or

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