$1. y'+1.25=5$

(1) $y(0)=6.6$

(2)如何用 *mathematica* 求解?

ANS:

(1)

$$\frac{dy}{dx}+\frac{5}{4}y=5$$

$$\frac{dy}{dx}=5-\frac{5}{4}y$$

$$\frac{dy}{dx}=-\frac{5}{4}(y-4)$$

$$\int\frac{dy}{y-4}=\int-\frac{5}{4}dx$$

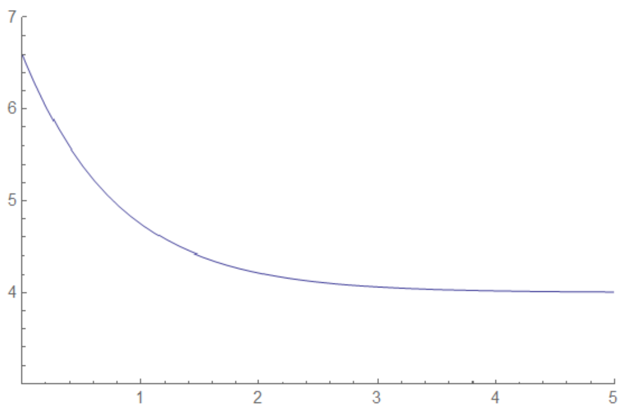
$$\ln|y-4|=-\frac{5}{4}x+c$$

$$y-4=c\cdot e^{\frac{-5}{4}x}$$

$$y=4+c\cdot e^{-\frac{5}{4}x}$$

$$y(0)=6.6\rightarrow 6.6=4+c\rightarrow c=2.6$$

$$y=4+2.6e^{-\frac{5}{4}x}$$



$2. A \xrightarrow{k_1} B \xrightarrow{k_2} C$

$[A]_{t=0} = A_0$, 求 $[A][B][C]$,繪圖?

$$\frac{d[A]}{dt} = -k_1[A]$$

$$\int \frac{d[A]}{[A]} = \int -k_1 dt$$

$$\ln[A] = -k_1 t + c$$

$$[A] = e^{-k_1 t} \cdot c^*, [A]_{t=0} = A_0 \Rightarrow c^*$$

$$[A]_t = A_0 e^{-k_1 t}$$

$$\frac{d[B]}{dt} = k_1[A] - k_2[B]$$

$$= k1A_0 e^{-k_1 t} - k2[B] \Rightarrow \frac{d[B]}{dt} + k_2[B]_t = k_1 A_0 e^{-k_1 t}$$

$$P(t) = k_2, r(t) = k_1 A_0 e^{-k_1 t}$$

$$h = \int p(t)dx = k_2 t, e^{-h} = e^{-k_2 t}$$

$$e^{h\cdot} \cdot r = e^{k_2 t} \cdot k_1 A_0 e^{-k_1 t} = k_1 A_0 e^{(k_{21} - k_1)t}$$

$$\int e^h \cdot r dx = \frac{k_1}{k_2 - k_1} A_0 e^{(k_2 - k_1)t}$$

$$[B]_t = e^{-h}\left[\int e^h \cdot r dx + c\right]$$

$$= \frac{k_1}{k_{2-}k_1} A_0 e^{-k_1 t} + e^{-k_2 t} \cdot c$$

$$[B]_0 = 0 = \frac{k_1}{k_{2-}k_1} A_0 + c \Rightarrow c = \frac{-k_1}{k_2 - k_1} A_0$$

$$\Rightarrow [B]_t = \frac{k_1}{k_{2-}k_1} A_0 [e^{-k_1 t} - e^{-k_2 t}]$$

$$[C]_t = A_0 - [A]_t - [B]_t$$

$$= A_0 - A_0 e^{-k_1 t} - \frac{k_1}{k_{2-}k_1} A_0 [e^{-k_1 t} - e^{-k_2 t}]$$