1.y''+36 y = 0

設 $y = e^{\lambda x}, y' = \lambda e^{\lambda x}, y = \lambda^2 e^{\lambda x}$

$\Rightarrow \lambda^2 e^{\lambda x} + 36 e^{\lambda x} = 0, \lambda^2 + 36 = 0, \lambda = \pm 6i, y = C_1 e^{6i} + C_2 e^{-6i}$

$$2.\mathrm{A} + \mathrm{B} \xrightarrow{k_1} \mathrm{C} + \mathrm{D}$$

$$[\mathrm{A}]_0 = \mathrm{A}_0, [\mathrm{B}]_0 = \mathrm{B}_0 = \mathrm{A}_0 + \delta, 求 [\mathrm{A}]_t = ?[\mathrm{B}]_t = ?$$

$$\frac{-d\mathrm{A}}{\mathrm{dt}} = k[\mathrm{A}][\mathrm{B}] = k[\mathrm{A}][[\mathrm{A}] + \delta]$$

$$\int \frac{d\mathrm{A}}{[\mathrm{A}][[\mathrm{A}] + \delta]} = -k_1 dt, \frac{1}{[\mathrm{A}][[\mathrm{A}] + \delta]} = \frac{1}{\delta}\left[\frac{1}{[\mathrm{A}]} - \frac{1}{[\mathrm{A}] + \delta}\right]$$

$$\frac{1}{\delta}\left(-\ln\left(\frac{1}{[\mathrm{A}]} - \frac{1}{[\mathrm{A}] + \delta}\right)\right) = k_1 t + c$$

$$\frac{1}{\delta}(\ln \frac{[[\mathrm{A}] + \delta]}{[\mathrm{A}]}) = k_1 t + c$$

$$\frac{[[\mathrm{A}] + \delta]}{[\mathrm{A}]} = e^{k_1 t\delta} c^*$$

$$[\mathrm{A}] = \frac{[[\mathrm{A}] + \delta]}{e^{k_1 t\delta} c^*}, [\mathrm{A}] e^{k_1 t\delta} c^* = [[\mathrm{A}] + \delta], [\mathrm{A}](e^{k_1 t\delta} c^* - 1) = \delta$$

$$[\mathrm{A}] = \frac{\delta}{e^{k_1 t\delta} c^* - 1}, [\mathrm{A}]_0 \Rightarrow \mathrm{A}_0 = \frac{\delta}{c^* - 1} \Rightarrow \mathrm{A}_0 c^* - \mathrm{A}_0 = \delta$$

$$c^* = \frac{\delta + \mathrm{A}_0}{\mathrm{A}_0} \Rightarrow [\mathrm{A}]_t = \frac{\delta \mathrm{A}_0}{(-\mathrm{A}_0 + \mathrm{A}_0 e^{k_1 t\delta} + \delta e^{k_1 t\delta})},$$

$$[\mathrm{B}]_t = \frac{\delta \mathrm{A}_0}{(-\mathrm{A}_0 + \mathrm{A}_0 e^{k_1 t\delta} + \delta e^{k_1 t\delta})} + \delta$$