

Applications of des

Section 14B

①

$$a \frac{d^2y}{dx^2} + b \frac{dy}{dx} + cy = 0.$$

$$y = Ae^{2x} + Be^{3x}$$

$$\frac{d^2i}{dt^2} + 7 \frac{di}{dt} + 10i = 0$$

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Soln:

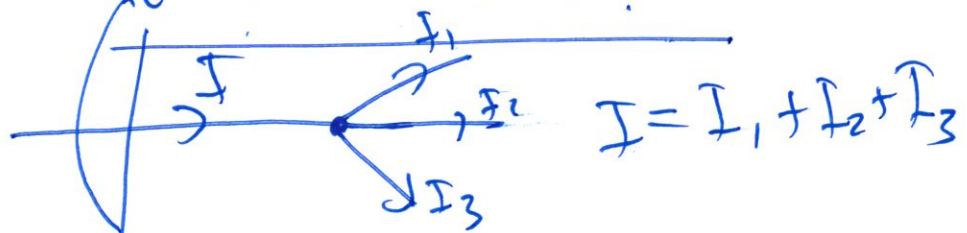
$$t=0, \quad i=0 \quad \left(\frac{di}{dt} = 3 \right)$$

$$m^2 + 7m + 10 = 0$$

$$(m+5)(m+2) = 0$$

$$m_1 = -5 \quad \& \quad m_2 = -2$$

$$i = Ae^{-5t} + Be^{-2t}$$



$$0 = Ae^0 + Be^0 = A + B$$

differentiate

$$A = -B.$$

$$\frac{di}{dt} = -5Ae^{-5t} - 2Be^{-2t}$$

$$3 = -5Ae^0 - 2Be^0 = -5A - 2B.$$

$$\left. \begin{array}{l} A+B=0 \\ -5A-2B=3 \end{array} \right\} \Rightarrow B=1, \underline{A=-1}.$$

$$y = A e^{-5t} + B e^{-2t}$$

$$\underline{y = -e^{-5t} + e^{-2t}}$$