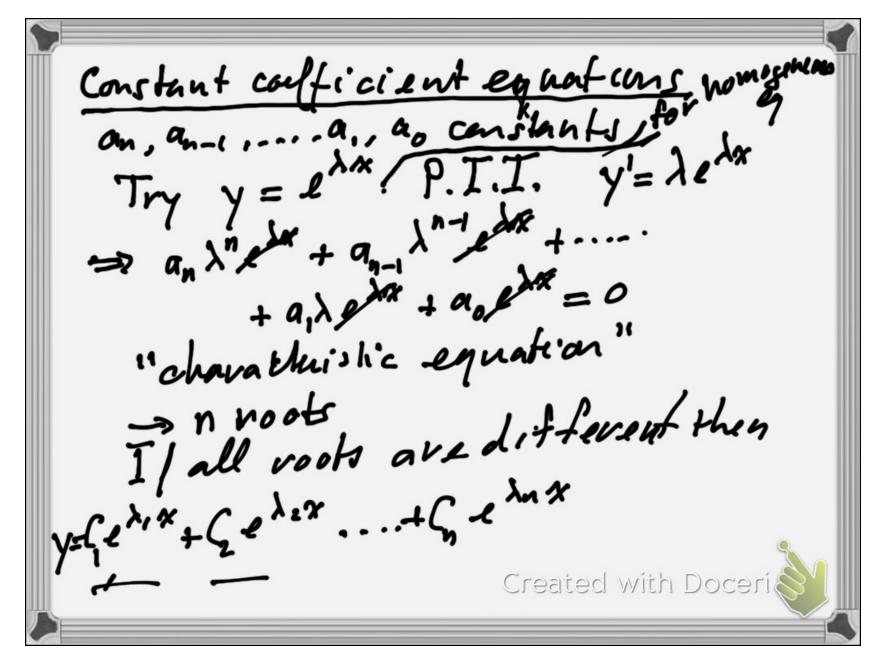
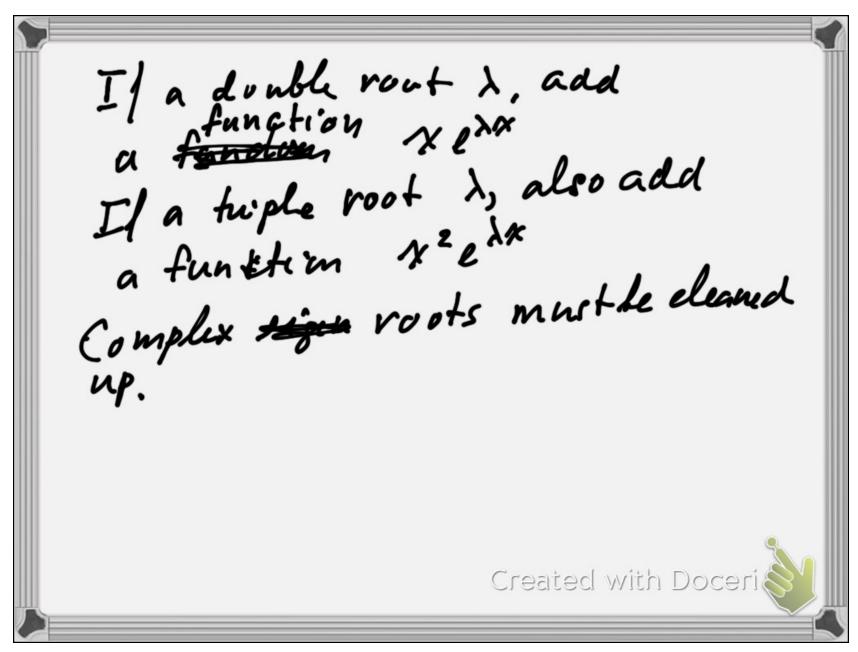
h:5060 Linear n-th order equations $a_n(x) \frac{d^n y}{dx^n} + a_{n-1}(x) \frac{d^{n-1} y}{dx^{n-1}} + \dots + a_n(x)$ homogeneous part -> n'integration constants General Solution y=C, y, (x) + C= /2 (x) + + C, Solution of





aim110220.pdf Page 4 of 8

Example
$$Y'' + Y' - 6Y = 0$$
 ODB
 $y(0) = 3$ $y'(0) = 1$ $I.C.$
Solution $2M: \lambda^2 + \lambda - 6 = 0$
 $\lambda_{1,2} = \frac{-1 \pm \sqrt{1+24}}{2} = \frac{-1 \pm 5}{2} = \begin{cases} -3 & \lambda_1 \\ 2 & \lambda \end{cases}$
 \Rightarrow several solution:
 $Y = C_1 e^{2x} + C_2 e^{-3x}$
Plus in itial conditions $-3 C_2 e^{2x}$
 $Y(0) = C_1 + C_2 = 3$
 $Y'(0) = 2C_1 - 3C_2 = 1$
Created with Doceri

aim110220.pdf Page 5 of 8

aim110220.pdf Page 6 of 8

$$y = C_{1} + C_{2} e^{x} + C_{3} x e^{x}$$

$$y(1) = y'(1) = 0 \quad y''(1) = e$$

$$y(1) : \quad C_{1} + C_{2} e + C_{3} e = 0$$

$$y'' = C_{2} e^{x} + C_{3} (x e^{x} + e^{x})$$

$$y'' = C_{2} e^{x} + C_{3} (x e^{x} + 2e^{x})$$

$$y'' = C_{2} e^{x} + C_{3} (x e^{x} + 2e^{x})$$

$$y'' = C_{2} e^{x} + C_{3} (x e^{x} + 2e^{x})$$

$$y''(1) : \quad C_{1} + C_{2} e + C_{3} e = 0$$

$$C_{2} e + C_{3} e = 0$$

$$C_{1} e = 0$$

$$C_{2} e + C_{3} e = 0$$

$$C_{3} e = 0$$

$$C_{4} e = 0$$

$$C_{5} e = 0$$

$$C_{6} e = 0$$

$$C_{7} e = 0$$

aim110220.pdf Page 7 of 8

Example:
$$y'' + 4y' + 9y = 0$$
 $i = 1/-1$

Solve: $\lambda^2 + 4\lambda + 9 = 0$
 $\lambda_{1,2} = \frac{-4 \pm 1/6 - 36}{2} = -2 \pm 1/-5$
 $= -2 \pm i\sqrt{5}$
 $i = 1/-1$
 $= -2 \pm i\sqrt{5}$
 $= -2 \pm i\sqrt{5}$

aim110220.pdf Page 8 of 8

$$Y = e^{-2x} \left[C_1 e^{itsx} + C_2 e^{-itsx} \right]$$

$$Y = e^{-2x} \left[C_1 \left\{ \cos(v_5x) + i \sin(v_5x) \right\} \right]$$

$$Y = e^{-2x} \left[C_1 + C_2 \cos(v_5x) + i \sin(v_5x) \right]$$

$$Y = e^{-2x} \left[C_1 + C_2 \cos(v_5x) + i \cos(v_5x) + i \cos(v_5x) \right]$$

$$Y = e^{-2x} \left[D_1 \cos(v_5x) + D_2 \sin(v_5x) \right]$$

$$Y = e^{-2x} \left[D_1 \cos(v_5x) + D_2 \sin(v_5x) \right]$$
Created with Doceri