

$$\sim 125, 128, 131, 134, 137, 140, 143, 146$$

$$s \ 1 \ 2 \ 3$$

$$D^3 x + 5D^2 x + 7Dx + 3x = 0$$

$$D^3 x + 5D^2 x + 7Dx + 3x = 0$$

$$-1 + 5 - 7 + 3 = 0$$

$$(D+1)$$

$$\begin{array}{r|l} D^3 x + 5D^2 x + 7Dx + 3x & D+1 \\ \hline D^3 x + D^2 x & D^2 + 4D + 3 \\ \hline -4D^2 + 7D & \\ \hline -4D^2 + 4D & \\ \hline 3D + 3 & \\ \hline 3D + 3 & \\ \hline 0 & \end{array}$$

$$(D+1)(D^2 + 4D + 3) = 0$$

$$(D+1)^2 (D+3) = 0$$

$$D_1 = -1 \quad d = 2$$

$$D_2 = -3 \quad d = 1$$

$$x(t) = (C_1 + C_2 t) e^{-t} + C_3 e^{-3t}$$

$$\sim 125$$

$$D^2 x + 6Dx + 13x = 0$$

$$D^2 + 6D + 13 = 0$$

$$D = -6 \pm 5i$$

$$D_1 = \frac{-6 - 5i}{2} = -3 - 2.5i$$

$$D_2 = -3 + 2.5i$$

$$x(t) = C_1 e^{(-3-2.5i)t} + C_2 e^{(-3+2.5i)t} = e^{-3t} (C_1 \cos 2.5t + C_2 \sin 2.5t)$$

$$L_2 = (D + (3+2.5i)D^0) (D - (2.5i-3)D^0)$$



~ 138

$$D^2 x + 5x = 0$$

$$D^2 + 5 = 0$$

$$D^2 = -5$$

$$D = \pm i\sqrt{5}$$

$$L_2 = (D - i\sqrt{5})^* (D + i\sqrt{5})$$

$$x(t) = C_1 \sin \sqrt{5}t + C_2 \cos \sqrt{5}t$$

~ 139

$$D^3 x + 4D^2 x - Dx - 4x = 0$$

$$D^3 + 4D^2 - D - 4 = 0$$

$$\begin{array}{r|l} D^3 + 4D^2 - D - 4 & D+1 \\ \hline D^3 + D^2 & D^2 + 3D - 4 \\ \hline -3D^2 - D - 4 & \\ \hline -3D^2 - 3D & \\ \hline -4D - 4 & \end{array}$$

$$(D^2 + 3D - 4) / (D+1) = 0$$

$$(D+1) / (D-1) (D+4) = 0$$

$$x(t) = C_1 e^{-t} + C_2 e^t + C_3 e^{-4t}$$

$$L_3 = (D + D^0) (D - D^0) (D + 4D^0)$$

~ 140

$$L_4 = (D - D^0)^3 (D - (2+i)D^0) (D - (2-i)D^0) (D - \sqrt{2}D^0)$$

$$D = 1$$

$$D = 2+i$$

$$D = 2-i$$

$$D = \sqrt{2}$$

$$d = 3$$

$$d = 1$$

$$d = 1$$

$$d = 1$$

$$x(t) = (C_1 + C_2 t + C_3 t^2) e^t + C_4 e^{(2+i)t} + C_5 e^{(2-i)t} + C_6 e^{\sqrt{2}t}$$



141

$$L_s = (D - (1 + i\sqrt{3})D^0)^3 (D - (1 - i\sqrt{3})D^0)^3 + D(D - D^0)$$

$$D = (1 + i\sqrt{3})$$

$$D = (1 - i\sqrt{3})$$

$$D = 0$$

$$D = 1$$

$$d = 3$$

$$d = 3$$

$$d = 1$$

$$d = 1$$

$$x(t) = [C_1 + C_2 t + C_3 t^2] e^{(1-i\sqrt{3})t} + [C_4 + C_5 t + C_6 t^2] e^{(1+i\sqrt{3})t} + C_7 + C_8 e^{-t}$$

143

$$L_s = (D - i\sqrt{5}D^0)^4 (D + i\sqrt{5}D^0)^4$$

$$D = i\sqrt{5}$$

$$D = -i\sqrt{5}$$

$$d = 4$$

$$d = 4$$

$$x(t) = [C_1 + C_2 t + C_3 t^2 + C_4 t^3] e^{i\sqrt{5}t} + [C_5 + C_6 t + C_7 t^2 + C_8 t^3] e^{-i\sqrt{5}t}$$



$$175, 177, 195 \quad t=0$$

~ 175

$$y_0(t) = e^{2t}, \quad y_1(t) = e^{-5t}, \quad y_2(t) = 1$$

$$L_0 y_0(t) + L_1 y_1(t) + L_2 y_2(t) = 0$$

$$L_0 e^{2t} + L_1 e^{-5t} + L_2 = 0$$

$$e^{2t} (L_0 + L_1 e^{-5t}) + L_2 = 0 \quad L_2 = 0$$

$$L_0 + L_1 e^{-5t}$$

$$W(t) = \begin{vmatrix} e^{2t} & e^{-5t} & 1 \\ 2te^{2t} & -5te^{-5t} & 0 \\ 2t^2e^{2t} + 4t^2e^{-5t} & -3te^{2t} + 9te^{-5t} & 0 \end{vmatrix}$$

$$W(0) = \begin{vmatrix} 1 & 1 & 1 \\ 0 & 0 & 0 \\ 2 & -3 & 0 \end{vmatrix} \neq 0 \quad \begin{matrix} 0 & 0 \\ -1 & 3 \end{matrix}$$

$$\Rightarrow W(t) \neq 0 \quad \text{for } \underline{I}$$

$$\lambda_1 = 2, \quad \lambda_2 = -3, \quad \lambda_3 = 0 \quad n=3$$

$$\lambda(t) \rightarrow$$

$$L_3 = (D-2)(D+3)D$$

$$L_3 = (D-2D^0)(D+3D^0)D$$







$$D^2 x = C_1(e^t + t^2 e^t) + (-e^t + t^2 e^t) C_2 + C_3 \sin t - C_4 \cos t$$

$$D^3 x = C_1(2e^t + 2te^t + t^3 e^t) + (te^t - t^3 e^t + 2te^t) C_2 - C_3 \sin t + C_4 \cos t$$

$$1) \begin{cases} 1 = C_1 + C_2 + C_4 \\ 0 = C_3 \\ 1 = C_1 + C_2 - C_4 \\ 0 = C_4 \end{cases}$$

$$\begin{cases} C_3 = 0, C_4 = 0 \\ C_1 = 1, C_2 = 0 \end{cases}$$

$$\Downarrow \\ y_0(t) = e^t$$

$$2) \begin{cases} 0 = C_1 + C_2 + C_4 \\ 1 = C_3 \\ 0 = C_1 - C_2 - C_4 \\ 1 = C_4 \end{cases}$$

$$\begin{cases} C_3 = C_4 = 1 \\ C_1 = 0, C_2 = -1 \end{cases}$$

$$\Downarrow \\ y_1(t) = -e^{-t} + \sin t + \cos t$$

5 + 95 = 100 - неграбительски =)