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Dis 2A

4.1

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$$\begin{bmatrix} t^2 & t|t| \\ 2t & 2|t| \end{bmatrix} = 2|t|t^2 - 2tt|t| = 0$$

So, it is linear dependent.

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$$\begin{bmatrix} e^t & e^{-3t} \\ e^t & -3e^{-3t} \end{bmatrix} = -4e^{-2t}$$

$$y(0) = 1 = C_1 e^0 + C_2 e^{-3\times 0} = C_1 + C_2 = 1$$

$$y'(0) = -2 = C_1 e^0 - C_2 3e^{-3\times 0} = C_1 - (-3)C_2$$

$$C_1 = \frac{1}{4}, C_2 = \frac{3}{4}$$

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$$y_2(t) = y_1(t)x = xt$$

$$(xt)' = x't + x, (x't + x)' = x''t + 2x'$$

$$t^2(x''t + 2x') - 2t(x't + x) + 2xt = 0$$

$$\Rightarrow t^3 x'' = 0 \Rightarrow x'' = 0 \Rightarrow x = t \Rightarrow y_2(t) = t^2$$

$$t^2(2) - 2t(2t) + 2t^2 = 0$$

$$y = C_1 t + C_2 t^2$$