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$$y'' - 4y = 0$$

$$m^2 - 4 = 0$$

$$m = \pm 2$$

$$\begin{aligned} y &= e^{mt} \\ y' &= me^{mt} \\ y'' &= m^2 e^{mt} \end{aligned}$$

$$y_c = c_1 e^{2t} + c_2 e^{-2t}$$

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$$y'' + y' = 0$$

$$m^2 + m = 0 \quad m = 0, -1$$

$$\begin{aligned} y_c &= c_1 e^{0t} + c_2 e^{-t} \\ &= c_1 + c_2 e^{-t} \end{aligned}$$

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$$y'' - 3y' + 2y = 0$$

$$m^2 - 3m + 2 = 0$$

$$m = +1, +2$$

$$y_c = c_1 e^t + c_2 e^{2t}$$

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$$y'' - 4y' + 3y = 0$$

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

$$(m-3)(m-1) = 0$$

$$m = 3 \text{ or } 1$$

$$y_c = c_1 e^{3t} + c_2 e^t$$