7/1

$$y''' = e^{2x}$$

$$y'' = \int dx\, e^{2x} = \frac{e^{2x}}{2} + C_1$$

$$y' = \int dx \left(\frac{e^{2x}}{2} + C_1 \right) = \frac{e^{2x}}{4} + C_1 x + C_2$$

$$y = \int dx \left(\frac{e^{2x}}{4} + C_1 x + C_2 \right) = \frac{e^{2x}}{8} + \frac{C_1 x^2}{2} + C_2 x + C_3$$

$$y(x) = \frac{e^{2x}}{8} + \frac{C_1 x^2}{2} + C_2 x + C_3$$

7/2

$y'' = x\sin x$

$y' = \int x\sin x\,dx$

$udv = uv - \int vdu$

$u = x \quad ; \quad v' = \sin x$

$u' = 1 \quad ; \quad v = -\cos x$

$-x\cos x - \int -\cos x\,dx$

$-x\cos x + \int \cos x\,dx$

$\sin x - x\cos x + C_1$

$y = \int dx(\sin x - x\cos x + C_1) = \int \sin x\,dx - \int x\cos x\,dx + C_1\int dx =$

$= C_1 x - \cos x - \int x\cos x\,dx$

$udv = uv - \int vdu$

$u = x \quad ; \quad v' = \cos x$

$u' = 1 \quad ; \quad v = \sin x$

$x\sin x - \int \sin x\,dx$

$x\sin x + \cos x + C_2$

$y(x) = C_1 x + C_2 - \cos x - x\sin x - \cos x$

$y(x) = C_1 x + C_2 - 2\cos x - x\sin x$

7/3

$y'' - 2yy' = 0$

$y' = v$

$y'' = v\dfrac{dv}{dy}$

$v\left(\dfrac{dv}{dy} - 2y\right) = 0$

$v = 0$

$y' = 0$

$y = 0dx$

$y(x) = C$

$\dfrac{dv}{dy} - 2y = 0$

$dv = 2ydy$

$v = y^2 + C_1$

$y' = y^2 + C_1$

$dx = \dfrac{dy}{y^2 + C_1}$

$C_2 + x = \displaystyle\int \frac{dy}{y^2 + C_1}$ $\quad \Big| \displaystyle\int \frac{dx}{x^2 + a^2} = \frac{1}{a} \operatorname{arctg} \frac{x}{a} + C \quad (a \neq 0)$

$C_2 + x = \dfrac{\operatorname{arctg} \frac{y}{\sqrt{C_1}}}{\sqrt{C_1}} \quad (C_1 > 0)$

$(C_2 + x)\sqrt{C_1} = \operatorname{arctg} \dfrac{y}{\sqrt{C_1}}$ $\quad \Big| \operatorname{arctg}(x) = a \to tg(a) = x$

$\dfrac{y}{\sqrt{C_1}} = tg((C_2 + x)\sqrt{C_1})$

$y(x) = \sqrt{C_1}\, tg((C_2 + x)\sqrt{C_1})$