дз 12

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$$y'''' = x$$

$$y''' = \int x dx = \frac{x^2}{2} + C_1 \quad y'' = \int (\frac{x^2}{2} + C_1) dx = \frac{x^3}{6} + C_1 x + C_2$$

$$y' = \int (\frac{x^3}{6} + C_1 x + C_2) dx = \frac{x^4}{24} + C_1 \frac{x^2}{2} + C_2 x + C_3$$

$$y = \int (\frac{x^4}{24} + C_1 \frac{x^2}{2} + C_2 x + C_3) dx = \frac{x^5}{120} + C_1 \frac{x^3}{6} + C_2 \frac{x^2}{2} + C_3 x + C_4$$

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$$y''(x+2)^5 = 1 \Leftrightarrow y'' = \frac{1}{(x+2)^5}$$

$$y' = \int \left(\frac{1}{(x+2)^5} \right) dx = -\frac{1}{4(x+2)^4} + C_1$$

$$y = \int \left(-\frac{1}{4(x+2)^4} + C_1 \right) dx = \frac{1}{12(x+2)^3} + C_1 x + C_2$$

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$$xy'' = y' \Leftrightarrow (y' = p) \Rightarrow x\frac{dp}{dx} = p$$

$$\frac{dp}{p} = \frac{dx}{x} \Rightarrow \ln(p) = \ln(x) + \ln(C_1) \Rightarrow y' = C_1 x$$

$$y = \int (C_1 x) dx = C_1 \frac{x^2}{2} + C_2$$

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$$3y'' - 2y' - 8y = 0 \Rightarrow 3\lambda^2 - 2\lambda - 8 = 0$$
$$D = B^2 - 4AC = 4 + 96 = 100 > 0, \sqrt{D} = 10$$
$$\lambda_1 = \frac{2 + 10}{6} = 2, \lambda_2 = \frac{2 - 10}{6} = -\frac{8}{6}$$
$$\underline{y = C_1 e^{2x} + C_2 e^{-\frac{8}{6}x}}$$

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$$y'' - 4y' + 3y = 0, y(0) = 6, y'(0) = 10$$
$$\lambda^2 - 4\lambda + 3 = 0, D = B^2 - 4AC = 16 - 12 = 4 > 0, \sqrt{D} = 2$$
$$\lambda_1 = \frac{4 + 2}{2} = 3, \lambda_2 = \frac{4 - 2}{2} = 1$$
$$\underline{y = C_1 e^{2x} + C_2 e^x}, \quad y(0) = C_1 e^0 + C_2 e^0 = \underline{C_1 + C_2 = 6}$$
$$y' = 2C_1 e^{2x} + C_2 e^x, \quad y'(0) = \underline{2C_1 + C_2 = 10} \Rightarrow \underline{C_1 = 4, C_2 = 2}$$