Intelligens Fejlesztőeszkozok - 2. beadandó

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1 feladat

$$\begin{cases} y' - \frac{2xy}{x^2+1} = x^3 + x \\ y(0) = 1 \end{cases} \tag{1}$$

$$y' - \frac{2xy}{x^2+1} = 0 \tag{2}$$

$$y' = \frac{2xy}{x^2+1} \tag{3}$$

$$\frac{dy}{dx} = \frac{2xy}{x^2+1} \tag{4}$$

$$\frac{dy}{y} = \frac{2xydx}{x^2+1} \tag{5}$$

$$\int \frac{1}{y} dy = \int \frac{2x}{x^2+1} dx \tag{6}$$

$$lny = lnx^2 + 1 + C \tag{7}$$

$$y = e^C(x^2+1) \tag{8}$$

$$yn = C(x^2+1) \tag{9}$$

$$yn = k(x)(x^2+1) \tag{10}$$

$$y'p = k'(x)(x^2+1) + 2k(x) \tag{11}$$

$$k'(x)(x^2+1) = x^3 + x \tag{12}$$

$$k'(x) = x \tag{13}$$

$$k'(x) = u'(x) \tag{14}$$

$$u'(x) = x \tag{15}$$

$$\frac{du}{dx} = x \tag{16}$$

$$du = xdx \tag{17}$$

$$\int 1du = \int xdx \tag{18}$$

$$u = \frac{x^2}{2} + c \tag{19}$$

$$y = \frac{x^2(x^2 + 2C)}{2} + \frac{x^2 + 2c}{2} \tag{20}$$

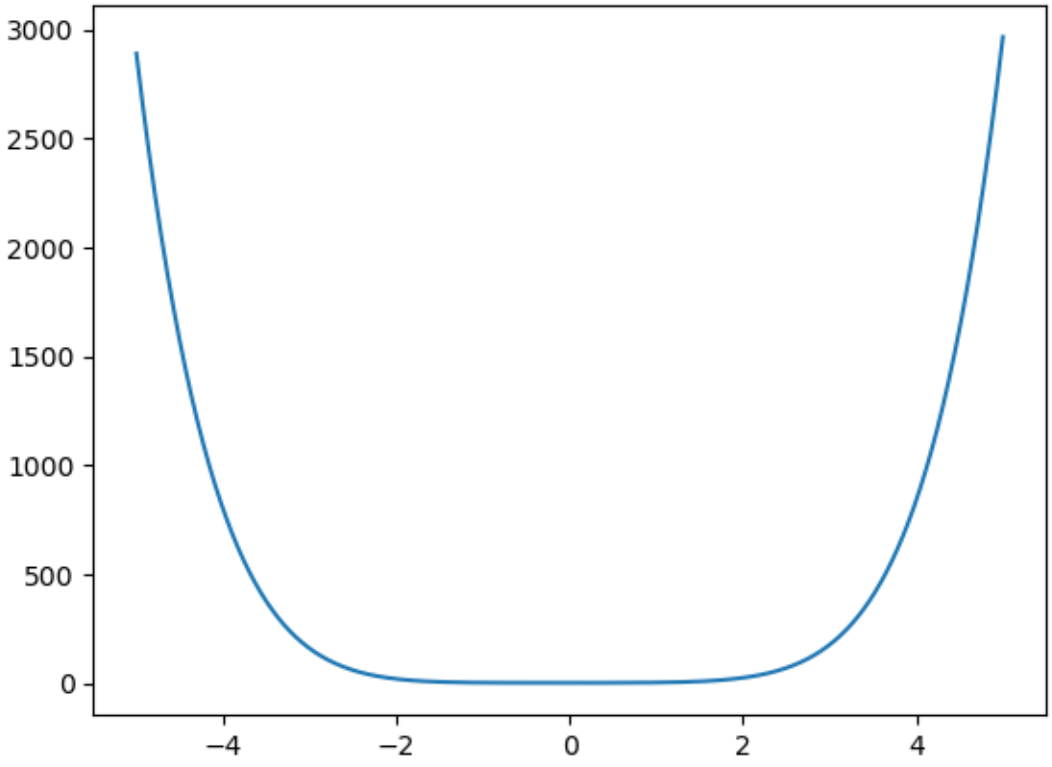
$$y = \frac{x^4}{2} + \frac{x^2}{2} + c(\frac{x^2}{2} + \frac{1}{2}) \tag{21}$$

$$y(0) = 1 \tag{22}$$

$$1 = \frac{c}{2} \tag{23}$$

$$c = 2 \tag{24}$$

$$y = \frac{x^4}{2} + \frac{x^2}{2} + 2(\frac{x^2}{2} + \frac{1}{2}) \tag{25}$$



2 feladat

$$\begin{cases} y'' - 4y' + 4y = 12x - 4 \\ y(0) = 3 \\ y'(0) = 8 \end{cases} \tag{26}$$

$$y'' - 4y' + 4y = 12x - 4 \tag{27}$$

$$\lambda^2 - 4\lambda + 4 = 0 \Rightarrow \frac{4 \pm \sqrt{4^2 - 4 - 2}}{2} \tag{28}$$

$$yn = (C1x + C)e^{2x} \tag{29}$$

$$yp = Ax + B \tag{30}$$

$$y'p = A \tag{31}$$

$$y''p = 0 \tag{32}$$

$$4Ax + 4B - 4A = 12x - 4$$

$$4A = 12$$

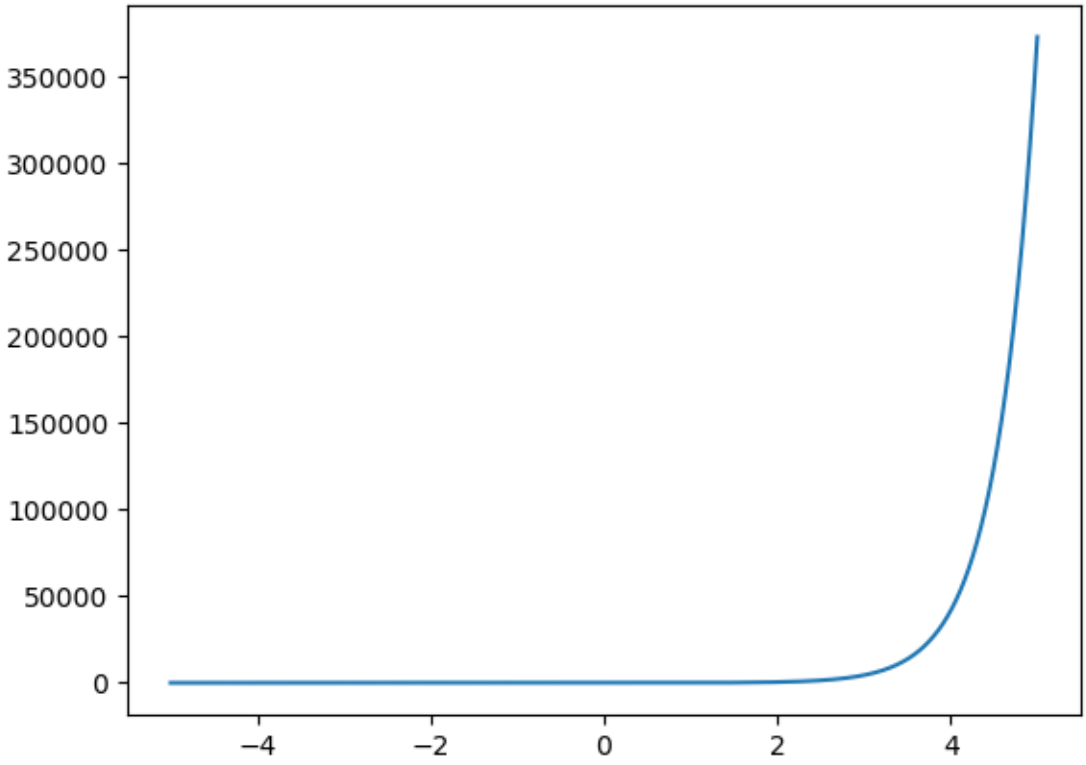
$$A = 3$$

$$4B - 4A = -4$$

$$B = 2 \tag{33}$$

$$y = (c_1x + c)e^{2x} + 3x + 2 \tag{34}$$

$$y = c_1xe^{2x} + ce^{2x} + 3x + 2 \tag{35}$$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