

Seminar07

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Enunțuri

Rezolvare

Exercițiu 5. a)

Enunțuri

Să se rezolve următoarele ecuații:

$$a) x^{II} + x^2 = 0$$

$$b) x^{II} + x \cdot x^I = 0$$

$$c) x \cdot x^{III} + 3 \cdot x^I \cdot x^{II} = 0$$

Rezolvare

Exercițiu 5. a)

$$\textcircled{5} a) x'' + x^2 = 0$$

$$F(x, x', x'') = 0$$

$$y = \frac{dx}{dt} = x' \Rightarrow x'' = y' = \frac{dy}{dt} = \frac{dy}{dx} \cdot \frac{dx}{dt} = y \cdot \frac{dy}{dx}$$

$$y \frac{dy}{dx} + x^2 = 0$$

$$y \frac{dy}{dx} = -x^2$$

$$y dy = -x^2 dx$$

$$\int y dy = -\int x^2 dx$$

$$\frac{y^2}{2} = -\frac{x^3}{3} + C \quad | \cdot 2$$

$$y^2 = -\frac{2x^3}{3} + C$$

$$y = \pm \sqrt{-\frac{2x^3}{3} + C}, \quad -\frac{2x^3}{3} + C \geq 0$$

$$y = \sqrt{-\frac{2x^3}{3} + C} = \frac{dx}{dt}$$

$$\frac{dx}{\sqrt{-\frac{2x^3}{3} + C}} = dt \quad (\Rightarrow) \int \frac{1}{\sqrt{-\frac{2}{3}x^3 + C}} dx = \int dt$$

$$\int \frac{1}{\sqrt{-\frac{2}{3}x^3 + C}} dx \Rightarrow t + C_1$$