

TD12 : Exercices complémentaires sur les équations différentielles

1. PREMIER ORDRE

Déterminez les solutions des ED suivantes :

(1)

$$\left\{ \begin{array}{l} y' + 2xy = 1 + 2x^2 \quad \text{sur } \mathbb{R}, \\ y(0) = 1 \end{array} \right\}$$

(2)

$$\left\{ \begin{array}{l} y' - 3y = e^{3x} \quad \text{sur } \mathbb{R}, \\ y(1) = 1 \end{array} \right\}$$

(3)

$$\left\{ (x + \sin x)y' + (1 + \cos x)y = 2x + x \cos x + \sin x \quad \text{sur }]0, +\infty[\right\}$$

(4)

$$\left\{ \begin{array}{l} y' + y = e^x + e^{2x} \quad \text{sur } \mathbb{R}, \\ y(0) = 0 \end{array} \right\}$$

(5)

$$\left\{ \begin{array}{l} y' + y = \sin x + \cos x \quad \text{sur } \mathbb{R}, \\ y(\pi) = 0 \end{array} \right\}$$

(6)

$$\left\{ \begin{array}{l} y' + 3y = 6 \sin(3x) \quad \text{sur } \mathbb{R}, \\ y(0) = 1 \end{array} \right\}$$

2. VARIATION DE LA CONSTANCE

(1)

$$\left\{ y' + 2xy = \frac{e^{-x^2}}{x} \quad \text{sur }]0, +\infty[\right\}$$

(2)

$$\left\{ y' + 2xy = xe^{\frac{-x^2}{2}} \quad \text{sur } \mathbb{R} \right\}$$

(3)

$$\left\{ (\sin x)y' - (\cos x)y = (\sin x)^2 \quad \text{sur }]0, \pi[\right\}$$

3. SECOND ORDRE

Déterminez les solutions des ED suivantes :

(1)

$$\left\{ \begin{array}{l} y'' - y' - 2y = 3e^{-x} \quad \text{sur } \mathbb{R}, \\ y(0) = 0 \\ y'(0) = 2 \end{array} \right\}$$

(2)

$$\left\{ \begin{array}{l} y'' - 3y' + 2y = 6e^{-x} \quad \text{sur } \mathbb{R}, \\ y(0) = 2 \\ y'(0) = 0 \end{array} \right\} \quad \left\{ \begin{array}{l} y'' - 4y' + 3y = 2e^x \quad \text{sur } \mathbb{R}, \\ y(0) = 1 \\ y'(0) = 2 \end{array} \right\}$$