Mohamed Khider University of Biskra

Faculty of FSESNV
Department of SM
University Year 2026/2027

Module: Mayhs 3
Level: 2^{nd} Year LMD
Speciality: Physics

Dirigated Work N°4

(DIFFERENTIAL EQUATIONS)

Exercise 1 (Homogeneous linear equations of the 1st order) *Solve the following differential equations:*

$$1).\begin{cases} \acute{y}+4y=0 \\ y(0)=2 \end{cases}$$

$$2).\begin{cases} x\acute{y}+(1+x)\,y=0 \\ y(1)=1 \end{cases}$$

$$3).\begin{cases} \left(1+x^2\right)\acute{y}-xy=0 \\ y(0)=1 \end{cases}$$

Exercise 2 (No homogeneous linear equations of the 1st order) *Solve the following differential equations:*

$$1).\begin{cases} x\acute{y}+y=x \\ y(2)=0 \end{cases} \qquad 4).\begin{cases} \acute{y}+y=x\exp(-x) \\ y(0)=1 \end{cases}$$

$$2).\begin{cases} x\acute{y}-2y=x^4 \\ y(1)=1 \end{cases} \qquad 5).\quad \acute{y}+2y=x^2$$

$$3).\begin{cases} \acute{y}-2y=\dfrac{-2}{1+\exp(-2x)} \\ y(0)=2 \end{cases}$$

Exercise 3 (Linear equations with separate variables) *Solve the following differential equations:*

$$1).\begin{cases} 2x+y\acute{y}=0 \\ y(1)=1 \end{cases} \qquad 2).\begin{cases} \acute{y}=\dfrac{1-y}{1-2x} \\ y(0)=0 \end{cases} \qquad 3).\begin{cases} \left(4-x^2\right)y\acute{y}=2(1+y^2) \\ y(1)=0 \end{cases}$$

Exercise 4 *Solve the following differential equation on* $\mathbb{R}$*:*

$$\left(1+x^2\right)\acute{y}+2xy=e^x+x.$$

Exercise 5 (Homogeneous linear equations of the 2nd order) *Solve the following differential equations:*

1). $\acute{\acute{y}}+y=0$ 2). $\acute{\acute{y}}$-$4y=0$ 3). $2\acute{\acute{y}}+\acute{y}-y=0$ 4). $\acute{\acute{y}}-6\acute{y}+9y=0.$

Exercise 6 (No homogeneous linear equations of the 2nd order) *Solve the following differential equations:*

1). $\acute{\acute{y}}+y=x^2-1.$ 2). $\acute{\acute{y}}$-$4y=13\cos(3x).$

3). $2\acute{\acute{y}}$+$\acute{y}-y=3\cos(2x)-\sin(2x).$ 4). $\acute{\acute{y}}-6\acute{y}+9y=e^{3x}.$

Charged of courses

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