People's Democratic Republic of Algeria
Ministry of Higher Education and Scientific Research

University of Batna 2
Faculty of Technology

Common Core of Science and Technology
Engineering Section

Module: Calculus 2 (Analyse 2)

Tutorial Session N°1

Exercise n°1
Solve the following differential equations.

a. $\frac{dy}{dx} = 4x^2$ initial conditions $y(1) = 0$.
b. $\frac{dy}{dx} = e^x$ initial conditions $(0\ , 2)$.

Exercise n°2
Solve the following differential equations.

a. $\frac{dy}{dx} = e^{-y} sinx$
b. $\frac{dy}{dx} = e^{-x} + c$ initial conditions $x = \frac{\pi}{2}\ y = 2$.
c. $\frac{dy}{dx} = \frac{3x}{5y+1}$ initial conditions $y(1) = 2$.
d. $\frac{dy}{dx} = e^{x-y}$ initial conditions $y(0) = 1$.
e. $\frac{d^2y}{dx^2} = 30$ initial conditions $y(0) = 0, y'(0) = 1$

Exercise n°3
What is the order of the following differential equations?

a. $x^4 \frac{d^3\ y}{dx^3} + x\frac{dy}{dx} - y = x^7$
b. $y^8 \frac{dy}{dx} + \frac{d^7y}{dx^7} = y + x^9$

Exercise n°4
Verify that $y(x)$ is a specific (particular) solution to the following ODEs.

a. $y(x) = e^{3x}$; $\frac{d^3y}{dx^3} - 9\frac{d^2y}{dx^2} = 0$
b. $y(x) = \ln(-x)$; $x < 0$; $xy' = 1$

Exercise n°5
Find the general and the specific (particular) solution to the following differential equations.

a. $\frac{d^2y}{dx^2} = 3x + 1$ $y(0) = 0$ $y'(0) = 3$
b. $y''' = 6$ $y(0) = y'(0) = y''(0) = 0$
f. $\frac{d^2y}{dx^2} = xe^x$ $y(0) = y'(0) = 0$

Exercise n°6

Solve the following differential equation. (Separable differential equations)

a. $3\frac{dy}{dx} = 2x$
b. $e^{2x}y' + e^{x} = 1$
c. $(y+1)(x^2+1) = x\frac{dy}{dx}$
d. $x^2\frac{dy}{dx} = y^2 \qquad y(1) = 2$
e. $\frac{dy}{dx} = 2x\sqrt{y-1}$

Exercise n°7

Solve the following first order linear ODE, using the method of variation of parameters.

a. $3\frac{dy}{dx} + 2y = 1$
b. $\frac{dy}{dx} + 3y = x$
c. $\frac{dy}{dx} + y\tan x = cosx$
d. $\frac{dy}{dx} - 2y = \sin x$
e. $\frac{dy}{dx} - xy = x$