

University Center of Mila

Institute of Science and
TechnologyDepartment of Electrical and
Mechanical Engineering**Series N°1: Differential equations****Exercise 1:** For the following initial conditions:

1. $x(0) = 1$ and $\dot{x}(0) = 0$

2. $x(0) = 0$ and $\dot{x}(0) = 2$

Find and graphically represent the solutions of the following **homogeneous differential equations**:

1. $\ddot{x} + 5\dot{x} + 4x = 0$

2. $\ddot{x} + 4\dot{x} + 4x = 0$

3. $\ddot{x} + 4\dot{x} + 5x = 0$

Exercise 2 : Find and graphically represent the solution of the following **homogeneous differential equation**:

$$\ddot{x} + 4x = 0$$

For the following initial conditions:

1- $x(0) = 1$ and $\dot{x}(0) = 0$

2- $x(0) = 0$ and $\dot{x}(0) = 2$

Exercise 3: Find the **general solution** of each of the following **inhomogeneous differential equations**:

1. $\ddot{x} + 4x = 5$

2. $\ddot{x} - 2\dot{x} + 5x = 2\cos t$

3. $\ddot{x} + 4x = \cos 2t$

4. $\ddot{x} - x = 3e^{2t} \cos 2t$

Note : $\dot{x} = \frac{dx}{dt}$ et $\ddot{x} = \frac{d^2x}{dt^2}$