

MAT 239 (Differential Equations) Classification of DEs

Consider the differential equation: $\frac{dQ}{dt} = -kQ$

Q What is the dependent variable?
t What is/are the independent variable(s)?

This is a 1st order linear ODE.

Consider the differential equation: $(1 - x^2)y'' - 2xy' + 2y = 0$

y What is the dependent variable?
x What is/are the independent variable(s)?

This is a 2nd order linear ODE

Consider the differential equation: $u_t + uu_x = 0$, or $\frac{\partial u}{\partial t} + u \frac{\partial u}{\partial x} = 0$.

u What is the dependent variable?
t, x What is/are the independent variable(s)?

This is a 1st order nonlinear PDE

Consider the differential equation: $\frac{d^2\theta}{dt^2} = -\frac{g}{L} \sin(\theta)$

θ What is the dependent variable?
t What is/are the independent variable(s)?

This is a 2nd order nonlinear ODE