

## MAT 239 (Differential Equations) Handout on Classification of Differential Equations

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

- \_\_\_\_\_ What is the dependent variable?
- \_\_\_\_\_ What is/are the independent variable(s)?
- \_\_\_\_\_ Is this an ODE or a PDE?
- \_\_\_\_\_ Is the DE linear?
- \_\_\_\_\_ What is the order of the DE?

Consider the differential equation:  $(1 - x^2)y'' + 2xy' + 6y = 0$

- \_\_\_\_\_ What is the dependent variable?
- \_\_\_\_\_ What is/are the independent variable(s)?
- \_\_\_\_\_ Is this an ODE or a PDE?
- \_\_\_\_\_ Is the DE linear?
- \_\_\_\_\_ What is the order of the DE?

Consider the differential equation:  $u_t + uu_x = 0$

- \_\_\_\_\_ What is the dependent variable?
- \_\_\_\_\_ What is/are the independent variable(s)?
- \_\_\_\_\_ Is this an ODE or a PDE?
- \_\_\_\_\_ Is the DE linear?
- \_\_\_\_\_ What is the order of the DE?

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

- \_\_\_\_\_ What is the dependent variable?
- \_\_\_\_\_ What is/are the independent variable(s)?
- \_\_\_\_\_ Is this an ODE or a PDE?
- \_\_\_\_\_ Is the DE linear?
- \_\_\_\_\_ What is the order of the DE?