

# CAAM 336 · DIFFERENTIAL EQUATIONS

## Homework 3

Posted Wednesday 28 August 2013. Due 5pm Wednesday 4 September 2013.

3. [25 points]

For each of the following equations, (a) specify whether it is an ODE or a PDE; (b) determine its order; and (c) specify whether it is linear or nonlinear. For those that are linear, specify whether they (d) are homogeneous or inhomogeneous; and (e) have constant or variable coefficients.

$$(1.1) \quad \frac{dv}{dx} + \frac{2}{x}v = 0$$

$$(1.2) \quad \frac{\partial v}{\partial t} - 3\frac{\partial v}{\partial x} = x - t$$

$$(1.3) \quad \frac{\partial u}{\partial t} - \frac{\partial}{\partial x} \left( 2u \frac{\partial u}{\partial x} \right) = 0$$

$$(1.4) \quad \frac{\partial u}{\partial t} + u \frac{\partial u}{\partial x} + \frac{\partial^3 u}{\partial x^3} = 0$$

$$(1.5) \quad \frac{d^2 y}{dx^2} - 7(1 - y^2) \frac{dy}{dx} + y = 0$$

$$(1.6) \quad \frac{d^2}{dx^2} \left( x^2 \frac{d^2 u}{dx^2} \right) = \sin(x)$$