

# MATH 3503 - Assignment 1

Due: January 17 2025

- 1 Classify the following equations. Is the equation an ODE or a PDE? What order is the DE? Is it homogeneous?**

a)  $\sin(t)\frac{d^2x}{dt^2} + x\cos(t) = t^2$

b)  $\frac{\partial u}{\partial x} + 3\frac{\partial u}{\partial y} = xy$

c)  $\frac{\partial^2 u}{\partial x^2} + u\frac{\partial^2 u}{\partial y^2} = 0$

d)  $x'' + tx^2 = t$

e)  $\frac{d^3f}{dx^3} = 12f$

- 2 Solve the following differential equations by using one of the following techniques: variable-separable or linear (with an integration factor). Please state the technique used. If initial conditions are given, provide the particular solution.**

a)  $\frac{dy}{dx} = \frac{x}{y}; y(0) = 1$

b)  $y' + y = 42$

c)  $\frac{dy}{dx} = 12x; y(1) = 2$

d)  $\frac{df}{dy} = y$

e)  $y' + 12y = e^x$