

# EMAT 213: The First Mid-Term Examination

Instructor: Dr. Ming Mei

1. (15pt) Point out the orders and linearity / nonlinearity for the following differential equations.

$$1). yy' = \sin x; \quad 2). (\sin x)y' = y; \quad 3). (\sin x)y'' = \sin y.$$

2. (25pt) Solve the homogeneous equation

$$\frac{dy}{dx} = \frac{y-x}{y+x}.$$

3. (25pt) Solve the following Bernoulli equation

$$\frac{dy}{dx} - y = e^x y^2.$$

4. (35pt) Solve the initial-value problem

$$(e^x + y)dx + (2 + x + y)dy = 0, \quad y(0) = 1.$$