

MATHEMATICS FOR AERO/MECHANICAL ENGINEERS**TUTORIAL SHEET 1****ORDINARY DIFFERENTIAL EQUATIONS I**

1. Find the general solution of the following first order differential equations:

$$(i) \quad \frac{dy}{dx} = 3x^2 - \sin x$$

$$(ii) \quad \frac{dy}{dx} + 5e^x = 0$$

$$(iii) \quad \frac{dy}{dx} = -3y$$

$$(iv) \quad \frac{1}{y} \frac{dy}{dx} = 5$$

$$(v) \quad \frac{dy}{dx} = y \cos x$$

$$(vi) \quad (1+x) \frac{dy}{dx} = 4y$$

$$(vii) \quad \frac{dy}{dx} = -5(y-20)$$

$$(viii) \quad \frac{dy}{dx} = 5e^{-2y}$$

$$(ix) \quad \sin x \frac{dy}{dx} + y \cos x = 0$$

$$(x) \quad \frac{dy}{dx} + \frac{y}{x} = 0$$

2. Find the general solution of the following first order differential equations:

$$(i) \quad \frac{dy}{dx} - \frac{1}{x} y = 1$$

$$(ii) \quad \frac{dy}{dx} + \frac{2}{x} y = x$$

$$(iii) \quad \frac{dy}{dx} + y = e^x$$

$$(iv) \quad \frac{dy}{dx} + 2xy = 2e^{-x^2} \quad (iv)$$

$$(v) \quad \frac{dy}{dx} + 3y = e^{2x}$$

$$(vi) \quad x^3 \frac{dy}{dx} + 3x^2 y = x$$

$$(vii) \quad x^2 \frac{dy}{dx} + 3xy = 1$$

$$(viii) \quad x \frac{dy}{dx} - 3y = x^5$$

$$(ix) \quad \frac{dy}{dx} + \tan x y = x \cos x$$

$$(ix)^* \quad \frac{dy}{dx} + \cot x y = \sin 2x$$