

# MATHEMATICS FOR AERO/MECHANICAL ENGINEERS

## TUTORIAL SHEET 2

### ORDINARY DIFFERENTIAL EQUATIONS II

Solve the following differential equations:

1.  $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = 0$

2.  $2\frac{d^2y}{dx^2} + 7\frac{dy}{dx} - 4y = 0$

3.  $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} = 0$

4.  $\frac{d^2y}{dx^2} + 25y = 0$

5.  $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + 10y = 0$

6.  $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 20y = 0$

7.  $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = 0$

8.  $\frac{d^2y}{dx^2} + 8\frac{dy}{dx} + 16y = 0$

9.  $9\frac{d^2y}{dx^2} + 12\frac{dy}{dx} + 4y = 0$

10.  $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 4y = 0$

11.  $s'' - 7s = 0$

12.  $s'' + 7s = 0$

13.  $\frac{d^2p}{dt^2} + \frac{dp}{dt} + p = 0$

14.  $\frac{d^2z}{dt^2} + \frac{dz}{dt} - 2z = 0$

15. If  $y = e^{2t}$  is a solution to the differential equation

$$\frac{d^2y}{dt^2} - 5\frac{dy}{dt} + ky = 0$$

find the value of the constant  $k$  and the general solution to this equation.