

## 國立雲林科技大學 109 學年度 碩士班招生考試試題

系所:機械系

科目:工程數學(1)

1. **(25%)** Consider the ordinary differential equation (O.D.E.) shown below, and y is a function of x

$$2x^2y' - xy + y^2 = 0.$$

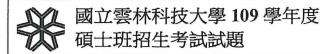
Please find the general solution of the O.D. E.

2. Please solve the following O.D.E.s with initial conditions:

(a) 
$$y'' + 2y' + y = 1$$
,  $y(0) = y'(0) = 0$  (5%)

(b) 
$$y'' + 2y' + y = e^x$$
,  $y(0) = y'(0) = 0$  (10%)

(c) 
$$y'' + 2y' + y = e^{-x}$$
,  $y(0) = y'(0) = 0$  (10%)



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## 3. (25%)

Please find the angle between vector  $\vec{A} = 3\vec{i} + \vec{j} + 5\vec{k}$  and the plane of x + y + z = 0.

## 4. (25%)

Let  $T: \mathbb{R}^3 \to \mathbb{R}^3$  be the linear transformation given by reflecting across the plane  $-x_1 + x_2 + x_3 = 0$ 

(i) Show the matrix M representing T with respect to standard basis is: (15 %)

$$M = \begin{bmatrix} 1/3 & 2/3 & 2/3 \\ 2/3 & 1/3 & -2/3 \\ 2/3 & -2/3 & 1/3 \\ 2/3 & -2/3 & 1/3 \end{bmatrix}$$

(ii) Find the inverse matrix  $M^{-1}$ .(10%)