



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%)



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)

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 $T: \mathbb{R}^3 \rightarrow \mathbb{R}^3$ 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 %)

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

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