

大同大學九十四學年度轉學考試試題

考試科目：工程數學

系別：電機工程學系

第1頁 共1頁

註：本次考試 不可以 參考自己的書籍及筆記； 不可以 使用字典； 不可以 使用計算器。

1. Solve the following differential equations

(1) $(2xy^3 + 2)dx + (3x^2y^3 + e^y)dy = 0$

(2) $y'' + 3y' + 2y = 4x^2.$

2. Solve the following initial value problem by using the Laplace transform

$y'' + 3y' + 2y = f(t); y(0) = y'(0) = 0,$ with

$$f(t) = \begin{cases} 1 & \text{for } 0 < t < 1 \\ 0 & \text{otherwise} \end{cases}$$

3. Let $A = \begin{bmatrix} -2 & 2 & 3 \\ -2 & 3 & 2 \\ -4 & 2 & 5 \end{bmatrix}.$

(1) Find the eigenvalues of A^{-1} and $A - 3I$, where I is an identity matrix.

(2) Find the bases for the eigenspaces of $A + 2I$.

(3) Find a matrix P that diagonalizes A , and determine $P^{-1}AP$.

4. Use matrix multiplication to find the image of the vector $(-2, 1, 2)$ if it is rotated -30° about the x -axis.

5. Let $f(x) = \begin{cases} 1, & -\frac{\pi}{2} < x < \frac{\pi}{2} \\ -1, & \frac{\pi}{2} < x < \frac{3\pi}{2} \end{cases}$. Find the Fourier series of $f(x)$ on $[-\frac{\pi}{2}, \frac{3\pi}{2}]$.

題號	1	2	3	4	5
分數	20	18	26	16	20