

# 淡江大學 107 學年度碩士班招生考試試題

13-1

系別：電機工程學系三組聯招

科目：工程數學

考試日期：3月11日(星期日) 第1節

本試題共 5 大題， 1 頁

1. Find the general solution of the differential equation:  $y' = 2xy^2$ . (20%)
2. Find the solution of the initial value problem:  $y'' - 3y' + 2y = e^x$ ,  $y(0) = 3$ ,  $y'(0) = 4$ . (20%)
3. Given the matrix  $A = \begin{bmatrix} 1 & 1 \\ 0 & 2 \end{bmatrix}$ ,
  - (i) find the eigenvalues and the associated eigenvectors of  $A$ . (15%)
  - (ii) find a matrix  $P$  such that  $P^{-1}AP$  is diagonal. (5%)
  - (iii) find the eigenvalues of  $A^{10}$ . (5%)
  - (iv) what is the rank of  $A$ . (5%)
4. (i) Find a set of parameterized equations for the points of the straight line from  $(1,0)$  to  $(2,3)$ . (5%)  
(ii) Suppose that the points of a curve  $c$  is parameterized by the following equations:  
 $x(t) = t, y(t) = 1+t, 0 \leq t \leq 1$ . Compute the line integral  $\int_c xy dx + y dy$ . (10%)
5. Compute the Fourier transform of the following function.

$$f(t) = \begin{cases} 0 & \text{for } t < 0 \\ e^{-2t} & \text{for } t > 0 \end{cases} \quad (15\%)$$