編號: 177,200

國立成功大學 108 學年度碩士班招生考試試題

系 所:電機工程學系、電機管記憶院一般電、茶料館

考試科目:工程數學

考試日期:0223,節次:3

第1頁,共1頁

※ 考生請注意:本試題不可使用計算機。 請於答案卷(卡)作答,於本試題紙上作答者,不予計分。

$$A = \begin{bmatrix} 0 - 1 \\ 4 & 0 \end{bmatrix}$$

Find its eigenvalues and eigenvectors and write the vector

$$u(0) = \begin{bmatrix} 2 \\ 0 \end{bmatrix}$$
 as a combination of those eigenvectors.

(a) Solve the equation du/dt = Au starting with the same vector u(0) at time t = 0.

2. 10% Let 
$$f(z) = \frac{1}{(2-z)(z+3)}$$

Write the Laurent series expansion of f(z) for  $5 < |z-2| < \infty$  as a power series of (z-2)

3. 20% (a) Let a and b in equation (1) are given constants, what will the equation be transformed to if z = In x is substituted in it.

$$x^2y'' + axy' + by = 0$$
 (x > 0)

(b) Use the result of part (a) to find the general solution of  $x^2y'' - 3xy + 3y = 0$ 

4. 15% Solve the following differential equation:

$$(x - 4x^2y^3)dy + (4x^4 - y)dx = 0$$

5. 15% Solve the following differential equation, using Laplace transformation method. y(t) is a function of t and u(t) is the unit step function.

$$y'' + 2y = u\left(t - \frac{\pi}{\sqrt{2}}\right) - u(t - \sqrt{2} \pi), \quad y(0)=1, \quad y'(0)=0$$

6. 20% Find the general solution of the following equation:

$$y' = \frac{y - x}{y + x}$$