大葉大學 98 學年度 研究所碩士班 招生考試試題紙					
系所別	組別	考試科目（中文名稱）	考試日期	節次	備註
電機系	乙	工程數學(微分方程、Laplace 轉換及線性代數)	4月12日	第 1 節	共2頁 08:30～10:00

註：考生可否攜帶計算機或其他資料作答，請在備註欄註明（如未註明，一律不准攜帶）

(1). (20 %) Solve the 6th order linear homogeneous differential equation $y^{(6)} + 2y^{(5)} + y^{(4)} - 2y^{(3)} - 2y^{(2)} = 0$, by assuming $y = e^{\lambda x}$.

(2). (15 %) Solve the nonhomogeneous differential equation $y'' - y = 2e^{x} + 6e^{2x}$.

(3). (15 %) Solve the initial value problem

$$y' + y\tan x = \sin 2x, \quad y(0) = 1$$

(4). (15 %) Suppose the solutions of $\mathbf{Ax} = \mathbf{b}$ are

$$\mathbf{A}\begin{bmatrix}1\\1\\1\end{bmatrix} = \begin{bmatrix}1\\0\\0\end{bmatrix}, \quad \mathbf{A}\begin{bmatrix}0\\1\\1\end{bmatrix} = \begin{bmatrix}0\\1\\0\end{bmatrix}, \quad \mathbf{A}\begin{bmatrix}0\\0\\1\end{bmatrix} = \begin{bmatrix}0\\0\\1\end{bmatrix}$$

If $\mathbf{b} = [3,5,8]^T$, what is the solution of $\mathbf{x}$?

(5). (15 %) Let $\mathbf{b} = [2,2,8]^T$ and matrix $\mathbf{A}$ as

$$\mathbf{A} = \begin{bmatrix}3 & 1 & 0\\0 & 1 & 0\\4 & 2 & 1\end{bmatrix}$$

Compute $\mathbf{A}^{100}\mathbf{b}$. (*Hint : use eigenvalues and eigenvectors*)

(6). (20 %) (a). Find the Laplace transform of $f(t)$ (figure (a)). (b). Find the Laplace transform of $g(t)$ (figure (b)).

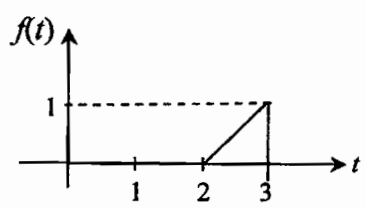

figure (a)

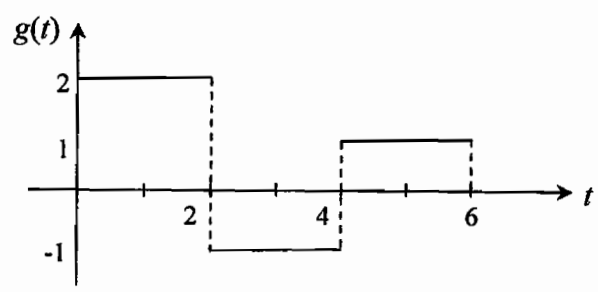

figure (b)