

所別	科目	准考證號碼 (請考生填入)	考試日期	節次	
電機工程研究所	工程數學(含微分方程、拉普拉斯轉換、線性代數)		95年5月7日	第二節	第1頁/共1頁

- 一、 Find the general solution of the differential equation $ty' + 2y = e^{-3t}$. (10%)
- 二、 Use the Laplace transform method to solve $y'' + 4y' + 3y = 2e^{-t}$, $y(0) = 1$ and $y'(0) = 0$. (10%)
- 三、 Find the inverse Laplace transform $\mathcal{L}^{-1}\left[\frac{s^2 + 12s + 32}{s^2 + 10s + 34}\right] = ?$ (10%)
- 四、 Let $A = \begin{bmatrix} 2 & -1 \\ -2 & 3 \end{bmatrix}$. Find $A^{1/2} = ?$ (10%)
- 五、 The 3×3 matrices A_1 , A_2 , and P where P is nonsingular satisfy $A_2 = P^{-1}A_1P$. Show that all the eigenvalues of A_1 are the same as those of A_2 . (10%)
- 六、 Solve the differential equation $y''(x) + 2y'(x) + y(x) = e^{-x}$. (10%)
- 七、 Consider $(1,0,1)$, $(0,1,0)$, and $(1,1,1)$ in R^3 . Determine and give a reason whether the three vectors are linearly independent. (10%)
- 八、 Solve the system of equations (10%)

$$-x_1 + x_2 + 3x_3 = -2$$

$$x_2 + 2x_3 = 4$$
- 九、 Find the eigenvalues and corresponding eigenvectors for (10%)

$$A = \begin{pmatrix} 2 & 1 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{pmatrix}$$
- 十、 Let A as the following matrix. Find A^5 . (10%)

$$A = \begin{pmatrix} 5 & -4 & 4 \\ 12 & -11 & 12 \\ 4 & -4 & 5 \end{pmatrix}$$