

國立虎尾科技大學九十八學年度研究所（碩士班）考試入學試題

所別：機械設計工程系碩士班

科目：考試科目 1 (工程數學)

注意事項：

(1) 共五大題，每大題二十分，共一百分。

(2) 請於答案卷上註明題號。

1. Find the general solution to: $y'+(x+2)y^2 = 0$
2. Determine the response of the damped mass-spring system under the given input force. [Hint: let $y(t) = e^{\lambda t}$]
 $y'' + 3y' + 2y = f(t)$, $y(0) = 1$, $y'(0) = 0$
 - (a) Let $f(t) = 0$, find the homogeneous solution $y_h(t)$. (10%)
 - (b) If step force $f(t) = 2$, find the nonhomogeneous solution $y(t)$. (10%)
3. Solve the initial value problem by using Laplace Transform: $y'+y=0, y(0)=1$. (20%)
4. Derive the eigenvalues and eigenvectors. $\begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$. (20%)
5. Find the Fourier series of $f(x)$ on the given interval. (20%)

$$f(x) = \begin{cases} 0, & -\pi < x < 0 \\ 1, & 0 \leq x < \pi \end{cases}$$