國　立　清　華　大　學　命　題　紙

九十三學年度 原子科學 (系)(所) 甲、丙 組碩士班入學考試

科目 應用數學 科號 3503 3703 共 1 頁第 1 頁 *請在試卷【答案卷】內作答

1. (10%) Solve $y(1-xy+x^2y^2)dx+x(x^2y^2-xy)dy=0$.
2. (10 %) Solve $y'+y\tan x=\sin 2x, y(0)=1$.
3. (10 %) Solve $y''-4y'+4y=0, y(0)=3, y'(0)=1$.
4. (10 %) Solve $y''+y=-2\sin x+4x\cos x$.
5. (10 %) Solve $x^2y''+xy'+(x-1)y=0$
6. (10 %) Assume that $f(x)=f(x+2\pi)$ is a periodic function. Find the Fourier series of $f(x)=\begin{cases}\sin x & -\pi<x<0\\ \cos x & 0<x<\pi\end{cases}$.
7. (20 %) Suppose that x and y are functions of t. Solve the system of differential equation $\begin{cases}x'+y'+3x=\cos t & x(0)=0\\ x'+y'=\sin t & y(0)=4\end{cases}$ using Laplace transform.
8. (20 %) Find eigenvalues and eigenvectors of matrices $\begin{bmatrix}1&1&1\\0&0&1\\1&1&0\end{bmatrix}$ and $\begin{bmatrix}4&-1&-2\\2&1&-2\\1&-1&1\end{bmatrix}$.