※ 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。

1· Solve the problem $\quad x^2\dfrac{d^2y}{dx^2}+3x\dfrac{dy}{dx}+y=\ln x \quad (25\%)$

2. If all eigenvalues λ of the following matrix A are $\lambda\geq 0$.
   Questions:
   (a) What is the range of k. (9%)
   (b) Following the part (a) to find the maximum eigenvalue and the minimum eigenvalue of A. (8%)
   (c) Find the eigenvector corresponding to the maximum eigenvalues for positive k. (8%)

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

3. Solve the problem $\dfrac{\partial^2 T}{\partial x^2}+\dfrac{\partial^2 T}{\partial y^2}=0,\quad x\geq 0,\ 0\leq y\leq 1$ with the boundary conditions

$T(x,0)=T(x,1)=0$ and $\lim\limits_{x\to\infty}T(x,y)=0$. (25%)

4. Calculate $\oint_C \dfrac{dz}{(z^2+1)(z-2i)^2}$ in which C is the circle $|z+i|=4$. (25%)