1．Solve $y^{\prime \prime}-y^{\prime}-2 y=\sin x$ ．
2．Solve $\mathrm{y}^{\prime \prime}+2 k \mathrm{y}^{\prime}+\left(\mathrm{k}^{2}+\mathrm{k}^{-2}\right) \mathrm{y}=0$

3．$f(t)=t \sin (\omega t)$ ，find its Laplace transform
4．Find the eigenvalues and eigenvectors of the matrix $A=\left[\begin{array}{ccc}1 & 0 & \sqrt{2} \\ 0 & 2 & 0 \\ \sqrt{2} & 0 & 0\end{array}\right]$ ．
5． $\mathbf{A}=[1,1,1], \mathbf{B}=[3,-1,2], \mathbf{C}=[2,1,4]$ ，and $\mathbf{D}=[3,3,10]$ are vectors in（a）\＆（b）and points in（c）．
（a）Find the angle between $\mathbf{A}$ and $\mathbf{B}$ ．
（b）Find the component of $\mathbf{A}$ in the direction of $\mathbf{B}$ ．
（c）Find the volume of a tetrahedron with the vertices at points $\mathbf{A}, \mathbf{B}, \mathbf{C}, \mathbf{D}$ ．

