Math 2318 – Linear Algebra

Professor: Fred Khoury

Assignment

YOU MUST SHOW ALL YOUR WORK. (One sided paper and it is not a ***group*** assignment)

1. Given the matrix $A=\begin{bmatrix} a & b \\ c & d \end{bmatrix}$.

a) Show that if $(a-d)^2+4bc>0$ and $bc\neq 0$, then prove that the eigenvectors of *A* are

$$\lambda_1=\frac{1}{2}\left[(a+d)+\sqrt{(a-d)^2+4bc}\right] \quad \textit{and} \quad \lambda_2=\frac{1}{2}\left[(a+d)-\sqrt{(a-d)^2+4bc}\right]$$

and the eigenvalues are $\begin{bmatrix} -b \\ a-\lambda_1 \end{bmatrix}$ *and* $\begin{bmatrix} -b \\ a-\lambda_2 \end{bmatrix}$ respectively.

b) If $(a-d)^2+4bc>0$ and $bc=0$ $(3\ \textit{parts})$, determine the eigenvalues and the eigenvectors of *A*.