$\sqrt{\sqrt{10}^2+25}$

$=\sqrt{35}$ $\sqrt{10+4}$

The 5th Exam on Linear Algebra Jan 10th, 2005

(1) (10%) Find the eigenvalues and the corresponding eigenvectors of

$$A=\begin{bmatrix}4 & -5 & 1\\ 1 & 0 & -1\\ 0 & 1 & -1\end{bmatrix}$$

$[x\ \ y\ \ z]\begin{pmatrix}-2x+z\\ -y\\ x-2z\end{pmatrix}$

(2) (10%) Show that $A=\begin{bmatrix}a & 1 & 0\\ 0 & a & 1\\ 0 & 0 & b\end{bmatrix}$ is defective.

$-2x^2+xz-y^2+xz-2z^2$

3.(10%) Compute e^A for the following matrix $A=\begin{bmatrix}-2 & -1\\ 6 & 3\end{bmatrix}$

$-2(x^2-xz+z^2)-y^2$

$-2(x^2-$

4. (15%) Solve the initial problem Y'=AY, $Y(0)=Y_0, Y_0=\begin{bmatrix}1\\1\end{bmatrix}$, $A=\begin{bmatrix}1 & -2\\ 0 & -1\end{bmatrix}, Y=\begin{bmatrix}y_1\\ y_2\end{bmatrix}$

5. (15%) Find an orthogonal or unitary matrix that diagonalize A, where

$ce^{\lambda t}$

$$A=\begin{bmatrix}1 & 3+i\\ 3-i & 4\end{bmatrix}.$$

x^2-xz+z^2

$(x^2+1^2+z^2)(x^2+(-1)^2+z^2)\geq x^2+z^2$

6. (15%) Find the singular value decomposition of $A=\begin{bmatrix}1 & 1\\ 2 & 2\end{bmatrix}$.

7. (15%) Factor the following matrix into LDL^T, where L is lower triangular with 1's on the diagonal and D is a diagonal matrix

$$A=\begin{bmatrix}4 & 2\\ 2 & 10\end{bmatrix}$$

8. (10%) Find a suitable change of coordinates(i.e. rotation and/or translation) so that the resulting conic section is in standard form $x^2+2xy+y^2+3x+y-1=0$.

9. (10%) Determine $A=\begin{bmatrix}-2 & 0 & 1\\ 0 & -1 & 0\\ 1 & 0 & -2\end{bmatrix}$ is positive definite , negative definitive or indefinite.

$(x+y\ \ \ x+y)\begin{pmatrix}x\\ y\end{pmatrix}$

~~x+y x+y~~

~~$-2x+z$~~

$\cot\theta=\frac{A-C}{B}$ $x^2+xy+yx+y^2$