Привести к каноническому виду

$2x^2+2y^2+2z^2-2xz+\sqrt{2}x-4y+\sqrt{2}z-9=0$

$$A=\begin{pmatrix}2&0&-1\\0&2&0\\-1&0&2\end{pmatrix}$$

$$\det(A-\lambda E)\begin{vmatrix}2-\lambda&0&-1\\0&2-\lambda&0\\-1&0&2-\lambda\end{vmatrix}=(2-\lambda)(2-\lambda)^2-1(0+(2-\lambda))=$$

$$=(2-\lambda)^3-(2-\lambda)=(2-\lambda)\left[(2-\lambda)^2-1^2\right]=(2-\lambda)(2-\lambda-1)(2-\lambda+1)=$$

$$=(2-\lambda)(1-\lambda)(3-\lambda)$$

$\lambda_1=1 \Rightarrow \begin{pmatrix}1&0&-1\\0&1&0\\-1&0&1\end{pmatrix}\sim\begin{pmatrix}1&0&-1\\0&1&0\end{pmatrix}$ $y=0$, $x=z$ $\quad (1;0;1)\cdot\frac{1}{\sqrt{2}}$ e_1

$\lambda_2=2 \Rightarrow \begin{pmatrix}0&0&-1\\0&0&0\\-1&0&0\end{pmatrix}\sim\begin{pmatrix}-1&0&0\\0&0&-1\end{pmatrix}$ $z=0$, $x=0$, y-любое $\quad (0;1;0)=\vec{e_2}$

$\lambda_3=3$

$\Downarrow \begin{pmatrix}-1&0&-1\\0&-1&0\\-1&0&-1\end{pmatrix}\sim\begin{pmatrix}1&0&1\\0&1&0\end{pmatrix}$ $y=0$, $x=-z$ $\quad (-1;0;1)\frac{1}{\sqrt{2}}$ $\bar{e}_3$

$$T=\begin{pmatrix}\frac{1}{\sqrt{2}}&0&-\frac{1}{\sqrt{2}}\\0&1&0\\\frac{1}{\sqrt{2}}&0&\frac{1}{\sqrt{2}}\end{pmatrix}$$

$$\begin{cases}x=\frac{1}{\sqrt{2}}x'-\frac{1}{\sqrt{2}}z'\\y=y'\\z=\frac{1}{\sqrt{2}}x'+\frac{1}{\sqrt{2}}z'\end{cases}$$