3-11.29

$$\begin{vmatrix} 3-\mu & 4 \\ 4 & 9-\mu \end{vmatrix} = \mu^2 - 12\mu + 11 = 0 = (\mu - 1)(\mu - 11).$$

For $\mu = 1$: $\begin{cases} 2x + 4y = 0, \\ 4x + 8y = 0, \end{cases}$ $x = 2,\ y = -1$ Eigenvector: $2\vec{i} - \vec{j}$.

For $\mu = 11$: $\begin{cases} -8x + 4y = 0, \\ 4x - 2y = 0, \end{cases}$ $x = 1,\ y = 2,$ Eigenvector: $\vec{i} + 2\vec{j}$.

Relative to new axes x' along $2\vec{i} - \vec{j}$, and y' along $\vec{i} + 2\vec{j}$, the deformation is given by

$$\begin{pmatrix} X' \\ Y' \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 11 \end{pmatrix} \begin{pmatrix} x' \\ y' \end{pmatrix},$$

that is, $X' = x'$, $Y' = 11y'$. This means that the plane is stretched by a factor 11 away from the x' axis parallel to the ±y' directions, with no deformation in the x' direction.