Step-1

Consider a 2×2 matrix $A=\begin{bmatrix} 2 & 2 \\ 2 & 2 \end{bmatrix}$

The characteristic equation of A is $|A-\lambda I|=0$

$$\begin{vmatrix} 2-\lambda & 2 \\ 2 & 2-\lambda \end{vmatrix}=0$$
$$(2-\lambda)^2-4=0$$
$$4+\lambda^2-4\lambda-4=0$$
$$\lambda=0,4$$

Step-2

On the other hand, apply the row transformation $R_2 \to R_2 - R_1$, and get $A \sim \begin{bmatrix} 2 & 2 \\ 0 & 0 \end{bmatrix}$

Its characteristic equation is;

$$\begin{vmatrix} 2-\lambda & 2 \\ 0 & 0-\lambda \end{vmatrix}=0$$
$$(2-\lambda)(-\lambda)=0$$
$$\lambda=0,2$$

Observe that the elementary row operation on the given matrix $\boxed{A=\begin{bmatrix} 2 & 2 \\ 2 & 2 \end{bmatrix}}$ has changed the Eigen values from 0, 4 to 0, and 2.

However, the zero Eigen value remained in the transformed matrix also.

The reason for this is; â€œ $\boxed{\text{if the given matrix has dependent rows, then at least one of the Eigen values is 0}}$. Also, when an elementary row or column operation is applied on the given matrix, the dependence of the columns cannot be changed.