5.4.35

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Question)

Find inverse with elementary transformations of matrix

$$\begin{pmatrix} 0 & 1 & 2 \\ -1 & 0 & -3 \\ -2 & 3 & 0 \end{pmatrix} \tag{1}$$

Solution

For elementary transformation, matrix can be written in form

$$\left[\begin{array}{ccc|ccc} 0 & 1 & 2 & 1 & 0 & 0 \\ -1 & 0 & -3 & 0 & 1 & 0 \\ -2 & 3 & 0 & 0 & 0 & 1 \end{array}\right] \tag{2}$$

Here, it is in form

$$[\mathbf{A}|\mathbf{I}] \tag{3}$$

With elementary transformation, we get

$$\left[\mathbf{I}|\mathbf{A}^{-1}\right] \tag{4}$$

Solution

So now in (2)

$$\left[\begin{array}{ccc|ccc} 0 & 1 & 2 & 1 & 0 & 0 \\ -1 & 0 & -3 & 0 & 1 & 0 \\ -2 & 3 & 0 & 0 & 0 & 1 \end{array}\right] \tag{5}$$

But before that check determinant of **A**

$$\begin{vmatrix} 0 & 1 & 2 \\ -1 & 0 & -3 \\ -2 & 3 & 0 \end{vmatrix} \tag{6}$$

$$0(0+9) - 1(0-6) + 2(-3-0) \tag{7}$$

$$0 + 6 - 6 = 0 \tag{8}$$

Since determinant is zero , No inverse exists

Direct Python

```
import numpy as np

a= np.array([[0,1,2],[-1,0,-3],[-2,3,0]])
det= np.linalg.det(a)

if det==0:
    print("No inverse exist")
else:
    inv = np.linalg.inv(a)
    print(inv)
```