

Exercise 3

$$A = \begin{pmatrix} 1 & 3 & -3 \\ -3 & 7 & -3 \\ -6 & 6 & -2 \end{pmatrix} \text{ and } A' = \begin{pmatrix} 5 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 3 \end{pmatrix}$$

As we know $A' = B^{-1} A B$ for B is invertible matrix

$$\det(A') = \det(B^{-1} A B)$$

$$\det(A') = \det(B^{-1}) \det(A) \det(B)$$

$$= \det(A) \det(B^{-1}) \det(B)$$

$$= \det A \det(B^{-1} B) \text{ for } A^{-1} A = I$$

$$= \det A \det(I)$$

$$= \det A \cdot 1$$

$$\det(A') = \det(A)$$

$$\det(A) = \det \begin{vmatrix} 1 & 3 & -3 \\ -3 & 7 & -3 \\ -6 & 6 & -2 \end{vmatrix}$$

$$= 1 \begin{vmatrix} 7 & -3 \\ 6 & -2 \end{vmatrix} - 3 \begin{vmatrix} -3 & -3 \\ -6 & -2 \end{vmatrix} - 3 \begin{vmatrix} -3 & 7 \\ -6 & 6 \end{vmatrix}$$

$$= -14 + 18 - 3(6 - 18) - 3(-18 + 42)$$

$$= 4 + 36 - 72$$

$$= -32$$

JATISH KUMAR

$$\det(A') = \det \begin{vmatrix} 5 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 3 \end{vmatrix}$$

$$= 5 \cdot 4 \cdot 3$$

$$= 60$$

And $\det(A) \neq \det(A')$

$$-32 \neq 60$$

than these matrices are not similar.