

QUIZ 3 MTH 329 Spring 2024

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

Solu: $\begin{bmatrix} 2 & 1 & 0 \\ 0 & 2 & 2 \\ -1 & 3 & 1 \end{bmatrix} \begin{matrix} r_3^* = r_3 - \frac{1}{2}r_1 \\ \sim \end{matrix} \begin{bmatrix} 2 & 1 & 0 \\ 0 & 2 & 2 \\ 0 & 5/2 & 1 \end{bmatrix}$

$\begin{matrix} r_3^* = r_3 - \frac{5}{4}r_2 \\ \sim \end{matrix} \begin{bmatrix} 2 & 1 & 0 \\ 0 & 2 & 2 \\ 0 & 0 & -3/2 \end{bmatrix}$

$\begin{matrix} r_1^* = \frac{1}{2}r_1 \\ r_2^* = \frac{1}{2}r_2 \\ r_3^* = -\frac{2}{3}r_3 \end{matrix} \begin{bmatrix} 1 & 1/2 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}$

$\begin{matrix} r_2^* = r_2 - r_3 \\ \sim \end{matrix} \begin{bmatrix} 1 & 1/2 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

$\begin{matrix} r_1^* = r_1 - \frac{1}{2}r_2 \\ \sim \end{matrix} \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

\Rightarrow three nonzero rows in echelon form

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