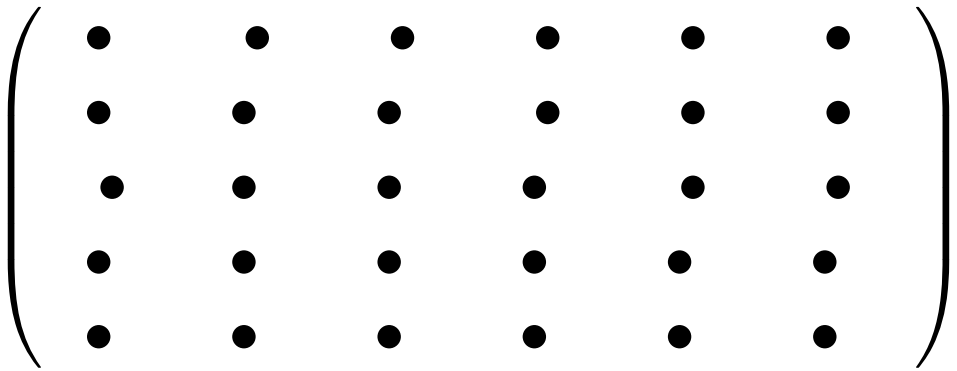
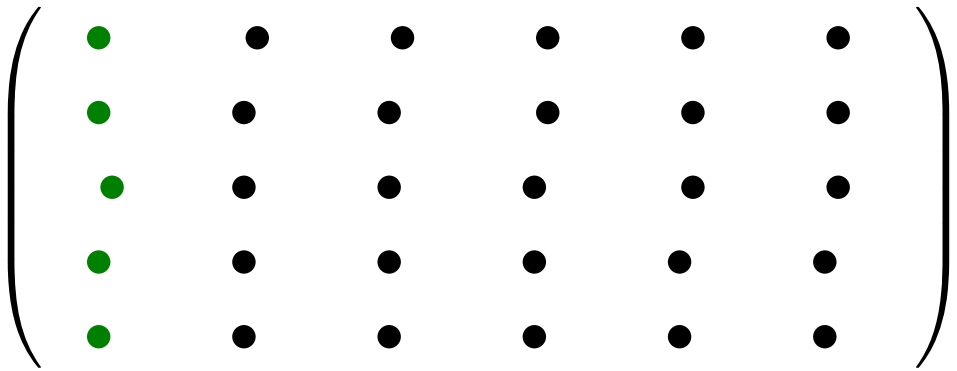
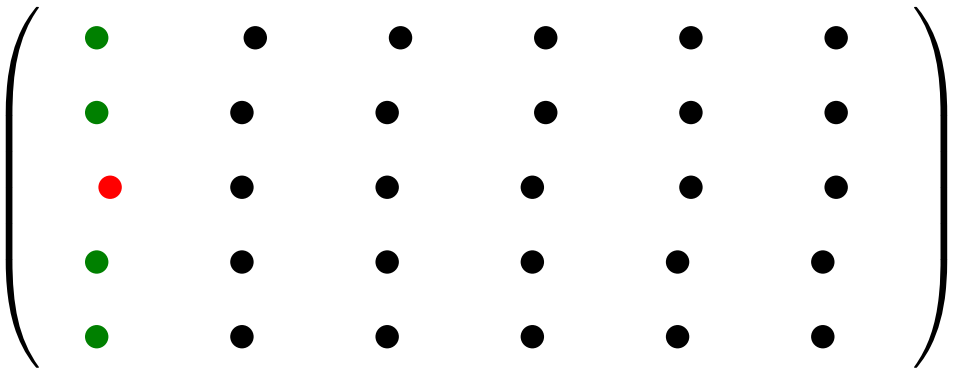
Transformation of a matrix to the row-echelon form



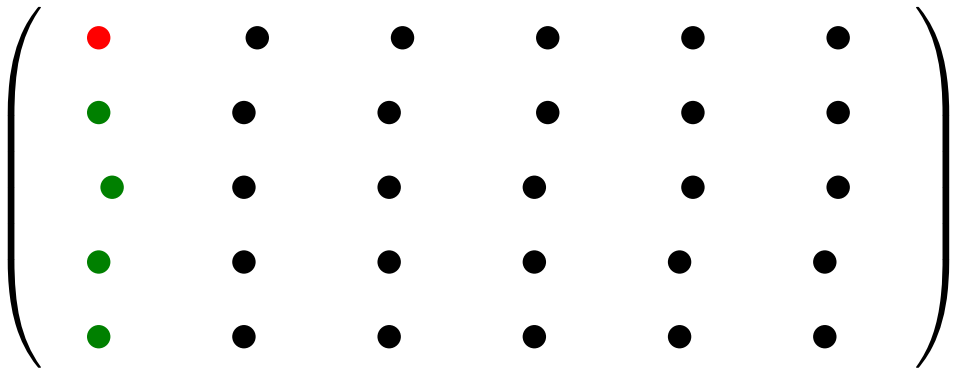
Transformation of a matrix to the row-echelon form



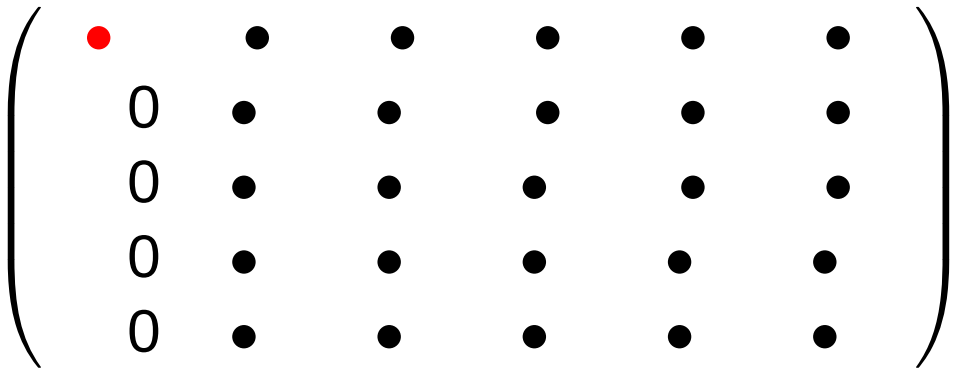
Transformation of a matrix to the row-echelon form



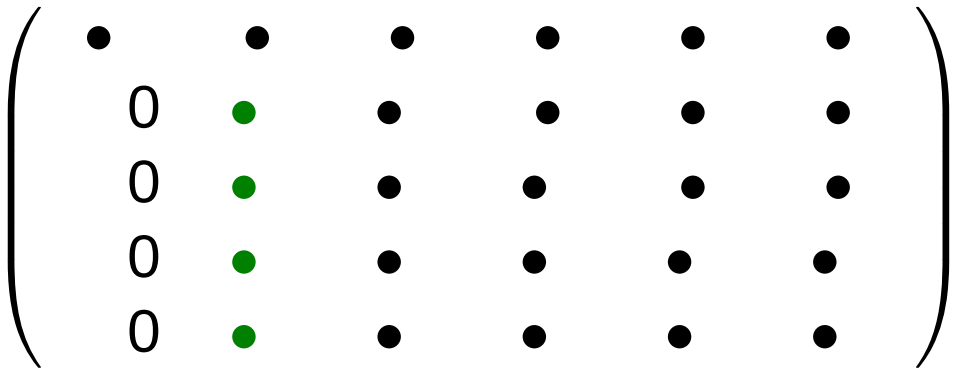
Transformation of a matrix to the row-echelon form



Transformation of a matrix to the row-echelon form



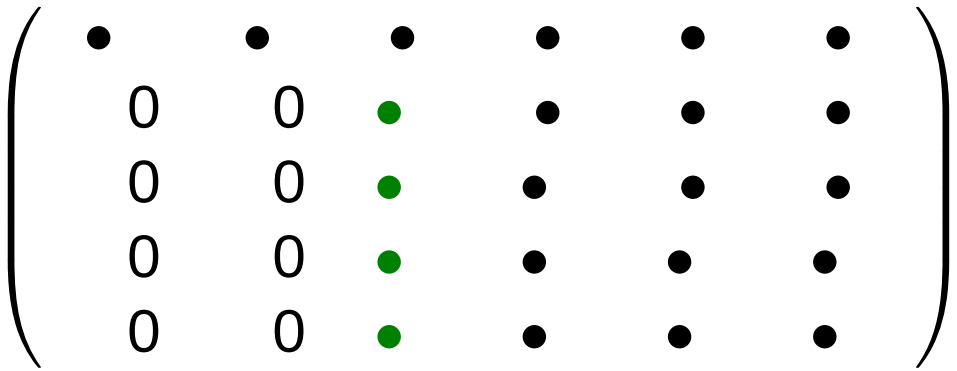
Transformation of a matrix to the row-echelon form



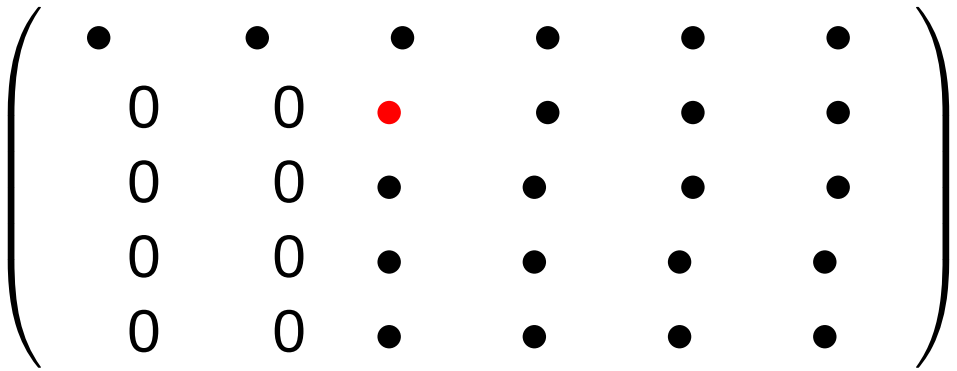
Transformation of a matrix to the row-echelon form

$$\begin{pmatrix} \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & \bullet & \bullet & \bullet & \bullet \end{pmatrix}$$

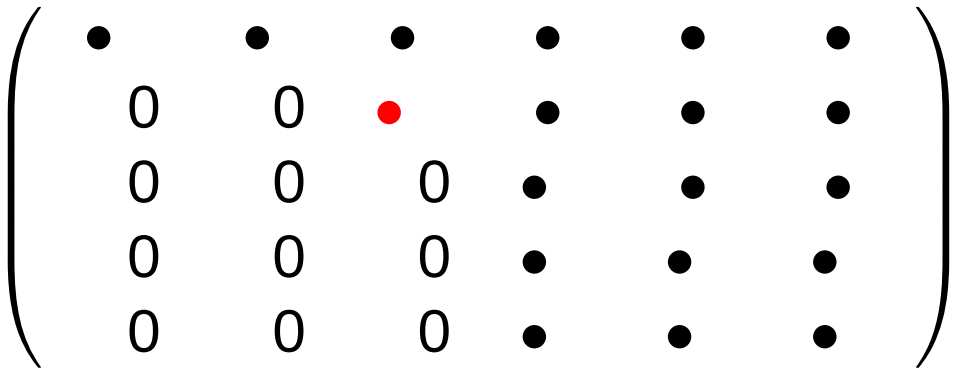
Transformation of a matrix to the row-echelon form



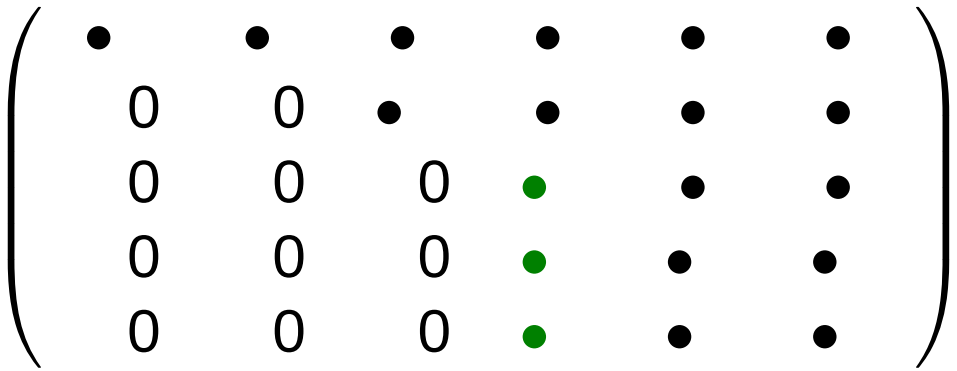
Transformation of a matrix to the row-echelon form



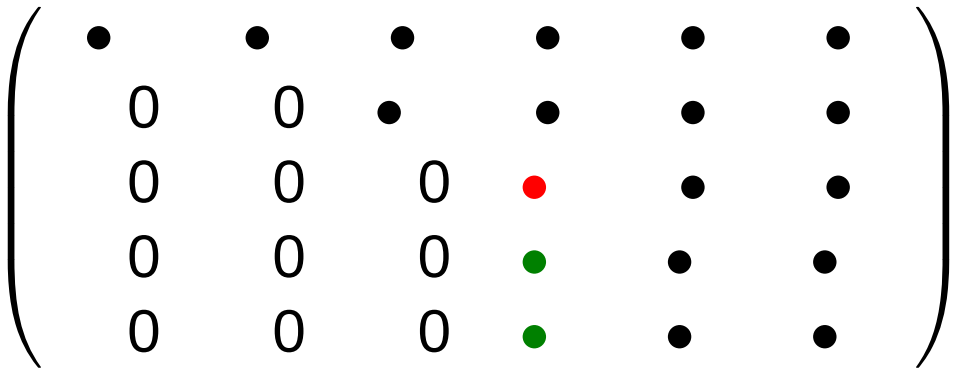
Transformation of a matrix to the row-echelon form



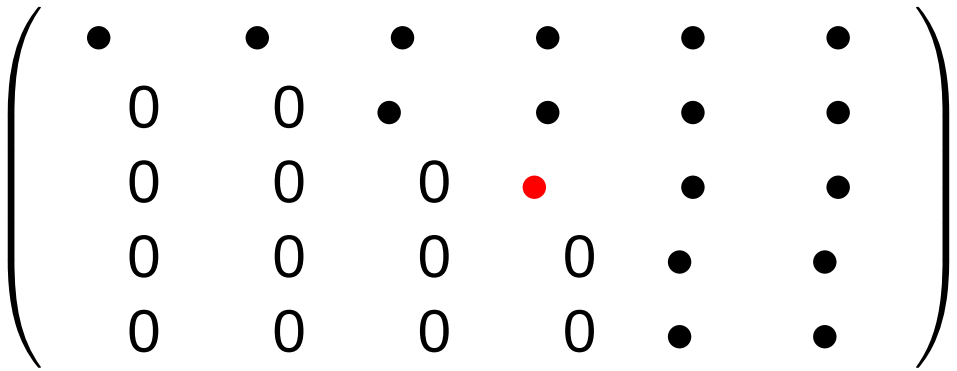
Transformation of a matrix to the row-echelon form



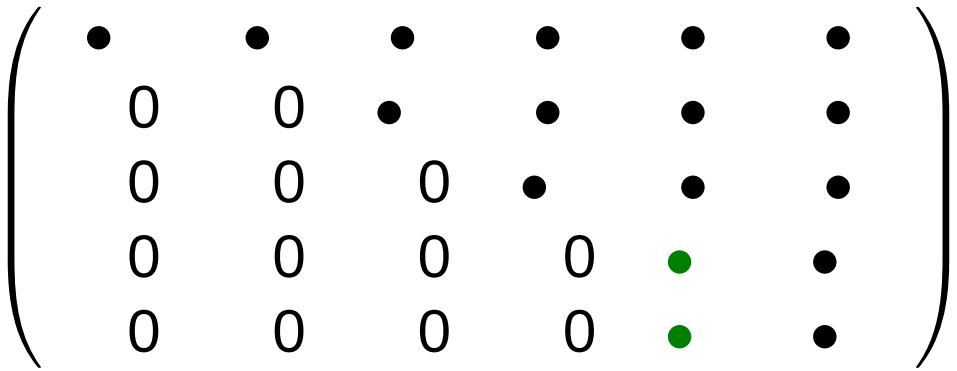
Transformation of a matrix to the row-echelon form



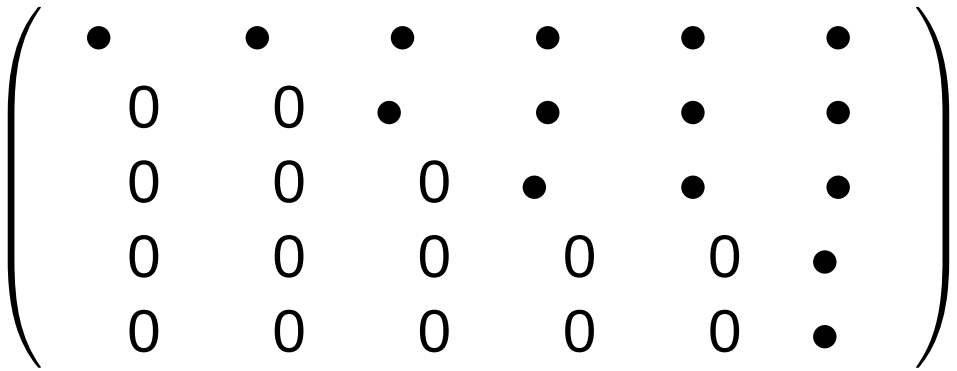
Transformation of a matrix to the row-echelon form



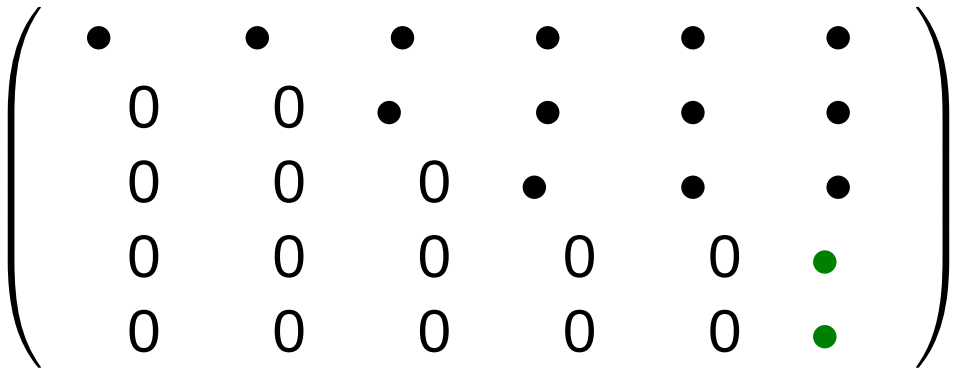
Transformation of a matrix to the row-echelon form



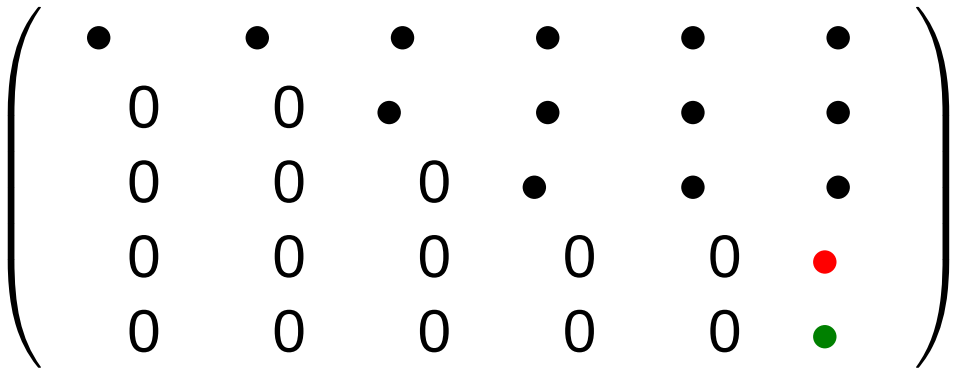
Transformation of a matrix to the row-echelon form



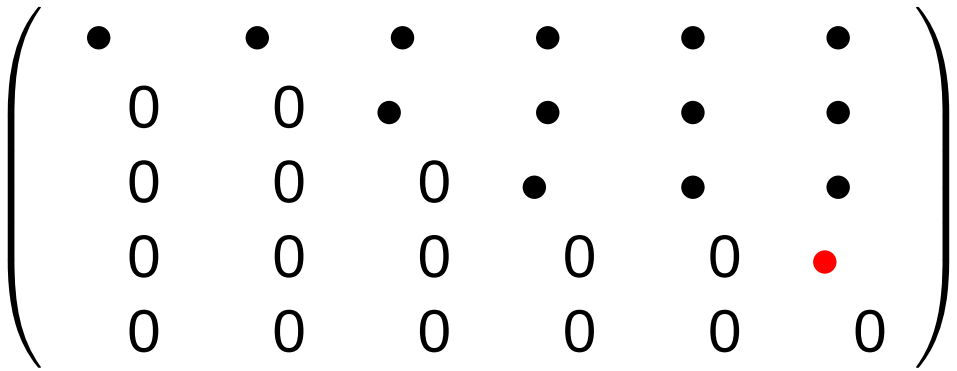
Transformation of a matrix to the row-echelon form



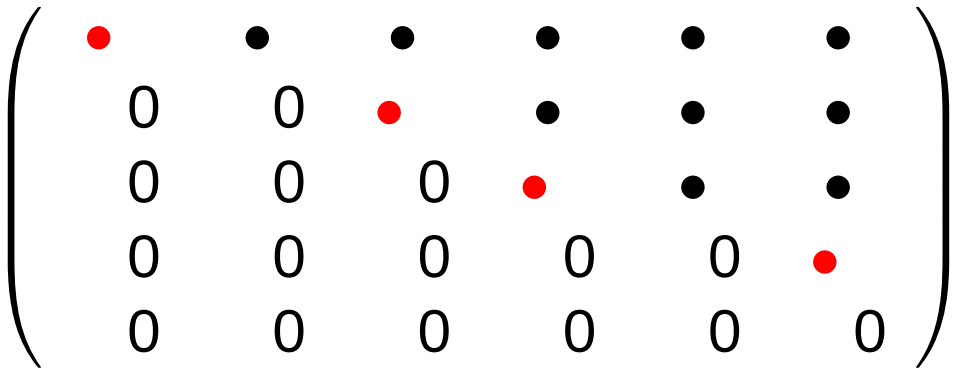
Transformation of a matrix to the row-echelon form



Transformation of a matrix to the row-echelon form



Transformation of a matrix to the row-echelon form



Computing the inverse of a matrix

$rk(\mathbb{A}) = n$

$$\begin{array}{cc} \mathbb{A} & \mathbb{I} \\ \left(\begin{array}{cccc|cccc} \bullet & \bullet & \bullet & \bullet & 1 & 0 & 0 & 0 \\ \bullet & \bullet & \bullet & \bullet & 0 & 1 & 0 & 0 \\ \bullet & \bullet & \bullet & \bullet & 0 & 0 & 1 & 0 \\ \bullet & \bullet & \bullet & \bullet & 0 & 0 & 0 & 1 \end{array}\right) & \end{array}$$

Computing the inverse of a matrix

$rk(\mathbb{A}) = n$

$$\mathbb{A} \rightsquigarrow \mathbb{S} \qquad\qquad \mathbb{I} \rightsquigarrow \mathbb{B}$$

$$\left(\begin{array}{cccc|cccc} \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & 0 & \bullet & \bullet & \bullet & \bullet & \bullet \end{array}\right)$$

Computing the inverse of a matrix

$rk(\mathbb{A}) = n$

$\mathbb{A} \rightsquigarrow \mathbb{S}$ $\qquad\qquad$ $\mathbb{I} \rightsquigarrow \mathbb{B}$

$$\left(\begin{array}{cccc|cccc} \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & 0 & \bullet & \bullet & \bullet & \bullet & \bullet \end{array}\right)$$

Computing the inverse of a matrix

$rk(\mathbb{A}) = n$

$$\mathbb{A} \rightsquigarrow \mathbb{S}' \qquad\qquad \mathbb{I} \rightsquigarrow \mathbb{B}'$$

$$\left(\begin{array}{cccc|cccc} 1 & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & 1 & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & 1 & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & 0 & 1 & \bullet & \bullet & \bullet & \bullet \end{array}\right)$$

Computing the inverse of a matrix

$rk(\mathbb{A}) = n$

$$\mathbb{A} \rightsquigarrow \mathbb{S}'' \qquad\qquad \mathbb{I} \rightsquigarrow \mathbb{B}''$$

$$\left(\begin{array}{cccc|cccc} 1 & \bullet & \bullet & 0 & \bullet & \bullet & \bullet & \bullet \\ 0 & 1 & \bullet & 0 & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & 1 & 0 & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & 0 & 1 & \bullet & \bullet & \bullet & \bullet \end{array}\right)$$

Computing the inverse of a matrix

$rk(\mathbb{A}) = n$

$$\mathbb{A} \rightsquigarrow \mathbb{S}''' \qquad\qquad \mathbb{I} \rightsquigarrow \mathbb{B}'''$$

$$\left(\begin{array}{cccc|cccc} 1 & \bullet & 0 & 0 & \bullet & \bullet & \bullet & \bullet \\ 0 & 1 & 0 & 0 & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & 1 & 0 & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & 0 & 1 & \bullet & \bullet & \bullet & \bullet \end{array}\right)$$

Computing the inverse of a matrix

$rk(\mathbb{A}) = n$

$$\mathbb{A} \rightsquigarrow \mathbb{S}''' \rightsquigarrow \mathbb{I} \qquad\qquad \mathbb{I} \rightsquigarrow \mathbb{B}''' \rightsquigarrow \mathbb{A}^{-1}$$

$$\left(\begin{array}{cccc|cccc} 1 & 0 & 0 & 0 & \bullet & \bullet & \bullet & \bullet \\ 0 & 1 & 0 & 0 & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & 1 & 0 & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & 0 & 1 & \bullet & \bullet & \bullet & \bullet \end{array}\right)$$

$\mathbb{A}$ invertible $\Rightarrow rk(A) = n$

$rk(\mathbb{A}) < n$ and $\mathbb{A}$ is invertible

$$\begin{array}{cc} \mathbb{A} & \mathbb{I} \\ \left(\begin{array}{cccc|cccc} \bullet & \bullet & \bullet & \bullet & 1 & 0 & 0 & 0 \\ \bullet & \bullet & \bullet & \bullet & 0 & 1 & 0 & 0 \\ \bullet & \bullet & \bullet & \bullet & 0 & 0 & 1 & 0 \\ \bullet & \bullet & \bullet & \bullet & 0 & 0 & 0 & 1 \end{array}\right) & \end{array}$$

$\mathbb{A} \cdot \mathbb{A}^{-1} = \mathbb{I}$

$\mathbb{A}$ invertible $\Rightarrow rk(A) = n$

$rk(\mathbb{A}) < n$ and $\mathbb{A}$ is invertible

$$\mathbb{A} \rightsquigarrow \mathbb{S} \qquad\qquad \mathbb{I} \rightsquigarrow \mathbb{B}$$

$$\left(\begin{array}{cccc|cccc} \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & 0 & \bullet & \bullet & \bullet & \bullet & \bullet \end{array}\right)$$

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$\mathbb{A}$ invertible $\Rightarrow rk(A) = n$

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$$\mathbb{A} \rightsquigarrow \mathbb{S} \qquad\qquad \mathbb{I} \rightsquigarrow \mathbb{B}$$

$$\left(\begin{array}{cccc|cccc} \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & 0 & 0 & \bullet & \bullet & \bullet & \bullet \end{array}\right)$$

$\mathbb{A} \cdot \mathbb{A}^{-1} = \mathbb{I}$

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$$\left(\begin{array}{cccc|cccc} \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & 0 & 0 & \bullet & \bullet & \bullet & \bullet \end{array}\right)$$

$\mathbb{A} \cdot \mathbb{A}^{-1} = \mathbb{I} \Rightarrow \mathbb{S} \cdot \mathbb{A}^{-1} = \mathbb{B}$

$\mathbb{A}$ invertible $\Rightarrow rk(A) = n$

$rk(\mathbb{A}) < n$ and $\mathbb{A}$ is invertible

$$\mathbb{A} \rightsquigarrow \mathbb{S} \qquad\qquad \mathbb{I} \rightsquigarrow \mathbb{B}$$

$$\left(\begin{array}{cccc|cccc} \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{array}\right)$$

$\mathbb{A} \cdot \mathbb{A}^{-1} = \mathbb{I} \Rightarrow \mathbb{S} \cdot \mathbb{A}^{-1} = \mathbb{B}$

$\mathbb{A}$ invertible $\Rightarrow rk(A) = n$

$rk(\mathbb{A}) < n$ and $\mathbb{A}$ is invertible

$$\mathbb{A} \rightsquigarrow \mathbb{S} \qquad\qquad \mathbb{I} \rightsquigarrow \mathbb{B}$$

$$\left(\begin{array}{cccc|cccc} \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{array}\right)$$

$\mathbb{A} \cdot \mathbb{A}^{-1} = \mathbb{I} \Rightarrow \mathbb{S} \cdot \mathbb{A}^{-1} = \mathbb{B} \Rightarrow rk(B) < n$

$\mathbb{A}$ invertible $\Rightarrow rk(A) = n$

$rk(\mathbb{A}) < n$ and $\mathbb{A}$ is invertible

$$\mathbb{A} \rightsquigarrow \mathbb{S} \qquad\qquad \mathbb{I} \rightsquigarrow \mathbb{B} \Rightarrow rk(\mathbb{B}) = n$$

$$\left(\begin{array}{cccc|cccc} \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{array}\right)$$

$\mathbb{A} \cdot \mathbb{A}^{-1} = \mathbb{I} \Rightarrow \mathbb{S} \cdot \mathbb{A}^{-1} = \mathbb{B} \Rightarrow rk(B) < n$