

m,n: pivot row and col
r = argmax (h = m ... nr, abs(A[h, n])) (not implemented, use r=m)

```
GaussElim (M) := [ A := M nr := rows (A) nc := cols (A) c := [ 1 .. nc ] m := 1 n := 1 ]
while (m ≤ nr) ∧ (n ≤ nc)
  r := m
  if SameQ (A r n , 0)
    n := n + 1
  else
    [ tmp c := A m c A m c := A r c A r c := tmp c ]
    for h := m + 1, h ≤ nr, h := h + 1
      [ f := A h n / A m n A h n := 0 ]
      [ k := [(n + 1) .. nc] A h k := A h k - f · A m k ]
    [ m := m + 1 n := n + 1 ]
A
```

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SameQ (a , b) := | num2str (a) = num2str (b) |
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Numeric

$$A := \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

$$GaussElim (A) = \begin{bmatrix} 1 & 2 & 3 \\ 0 & -3 & -6 \\ 0 & 0 & 0 \end{bmatrix}$$

$$\text{maple} (gausselim (A)) = \begin{bmatrix} 1 & 2 & 3 \\ 0 & -3 & -6 \\ 0 & 0 & 0 \end{bmatrix}$$

$$A := \begin{bmatrix} 1 & 2 & -1 & -4 \\ 2 & 3 & -1 & -11 \\ -2 & 0 & -3 & 22 \end{bmatrix}$$

$$GaussElim (A) = \begin{bmatrix} 1 & 2 & -1 & -4 \\ 0 & -1 & 1 & -3 \\ 0 & 0 & -1 & 2 \end{bmatrix}$$

$$\text{maple} (gausselim (A)) = \begin{bmatrix} 1 & 2 & -1 & -4 \\ 0 & -1 & 1 & -3 \\ 0 & 0 & -1 & 2 \end{bmatrix}$$

Symbolic

$$A := \begin{bmatrix} 1 & x & 3 \\ 4 & 5 & 6 \\ 7 & 8 & y \end{bmatrix}$$

$$GaussElim (A) = \begin{bmatrix} 1 & x & 3 \\ 0 & 5 - 4 \cdot x & -6 \\ 0 & 0 & \frac{3 \cdot (-7 \cdot (5 - 4 \cdot x) + 2 \cdot (8 - 7 \cdot x)) + y \cdot (5 - 4 \cdot x)}{5 - 4 \cdot x} \end{bmatrix}$$

$$\text{maple} (gausselim (A)) = \begin{bmatrix} 1 & x & 3 \\ 0 & 5 - 4 \cdot x & -6 \\ 0 & 0 & \frac{3 \cdot (19 - 14 \cdot x) + y \cdot (-5 + 4 \cdot x)}{-5 + 4 \cdot x} \end{bmatrix}$$

$$A := \begin{bmatrix} 1 & 2 & 3 \\ x & 5 & 6 \\ 7 & 8 & y \end{bmatrix}$$

$$GaussElim (A) = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 5 - 2 \cdot x & 3 \cdot (2 - x) \\ 0 & 0 & \frac{3 \cdot (-7 \cdot (5 - 2 \cdot x) + 6 \cdot (2 - x)) + y \cdot (5 - 2 \cdot x)}{5 - 2 \cdot x} \end{bmatrix}$$

$$\text{maple} (gausselim (A)) = \begin{bmatrix} 1 & 2 & 3 \\ 0 & -6 & -21 + y \\ 0 & 0 & \frac{3 \cdot (-23 + 8 \cdot x) + 5 \cdot y - 2 \cdot x \cdot y}{6} \end{bmatrix}$$

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