Matrice

$$A = \begin{matrix} a_{11} & a_{12} & \dots & a_{n1} \\ a_{21} & a_{22} & \dots & a_{n2} \\ \dots & \dots & \dots & \dots \\ a_{n1} & a_{n2} & \dots & a_{nn} \end{matrix}$$

$$1 \le i \le n$$
$$1 \le j \le n$$

1) $m = 1 => Matricea\ linie$

$$A = (a_{11}\ a_{12} \dots\ a_{1n})$$

2) $n = 1 => Matricea\ coloana$

$$A = \begin{matrix} a_{11} \\ a_{21} \\ \dots \\ a_{m1} \end{matrix}$$

3) $m = n => matrice\ patratica$

Adunare:

$$0 + A = A + 0 = A \qquad A + (-A) = -A + A = 0$$

Inmultire:

$$A = \begin{pmatrix} a & b \\ c & d \end{pmatrix} \quad B = \begin{pmatrix} e & f \\ g & h \end{pmatrix}$$

$$A * B = \begin{pmatrix} a * e + b * g & a * f + b * h \\ c * e + d * g & c * f + d * h \end{pmatrix}$$

$$A * B \neq B * A \qquad (A * B) * C = A * (B * C)$$

El.neutru:

$$I_n = \begin{pmatrix} 1 & 0 & \dots & 0 \\ 0 & 1 & \dots & 0 \\ \dots & \dots & \dots & \dots \\ 0 & 0 & \dots & 1 \end{pmatrix} \qquad A * I = I * A$$

Calculul lui A^n:

$A^n = se\ calculeaza\ A^1, A^2, A^3, \dots$ *pana se observam o regula*

$$Daca\ A = \begin{pmatrix} \cos x & \pm\sin x \\ \mp\sin x & \cos x \end{pmatrix} => A^n = \begin{pmatrix} \cos nx & \pm\sin nx \\ \mp\sin nx & \cos nx \end{pmatrix}$$

sau cu BINOMUL LUI NEWTON: $A = I + B$

$A^n = (I+B)^n = \sum_{k=0}^{n} C_n^k I^{n-k} B^k$

Relatia Canley-Hamilton:

$Tr(x) = a + d$ $\quad$! $(Tr(x))^2 = -a \ => \ Tr(x) = \pm i\sqrt{a}$

$\det(x) = a * d - b * c$

$A = B \ => \ \det A = \det B$

$$x^2 - Tr(x) * x + det\ x * I_2 = O_2$$

Determinanti:

1. de ordin 2:

$$\begin{vmatrix} a & b \\ c & d \end{vmatrix} = a * d - b * c$$

2. de ordin 3:

$$\begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix} = a * e * i + b * f * g + d * h * c - g * e * c -$$
$$-a * f * h - d * b * i$$

3. de ordin n:

-*are* $\boldsymbol{n}!$ *termeni*

-*face zerouri prin adunarea si scaderea L si C*

-*dezvoltarea dupa o linie / o coloana*:

$$\begin{vmatrix} a_{11} & a_{12} & a_{13} & a_{14} \\ a_{21} & a_{22} & a_{23} & a_{24} \\ a_{31} & a_{32} & a_{33} & a_{34} \\ a_{41} & a_{42} & a_{43} & a_{44} \end{vmatrix} = a_{21}(-1)^{2+1} * \begin{vmatrix} a_{12} & a_{13} & a_{14} \\ a_{32} & a_{33} & a_{34} \\ a_{42} & a_{43} & a_{44} \end{vmatrix}$$

Transpusa unei matrici:

$$A = \begin{pmatrix} a & b & c \\ d & e & f \end{pmatrix} \qquad {}^{t}A = \begin{pmatrix} a & d \\ b & e \\ c & f \end{pmatrix} \qquad a_{ij} \to a_{ji}$$