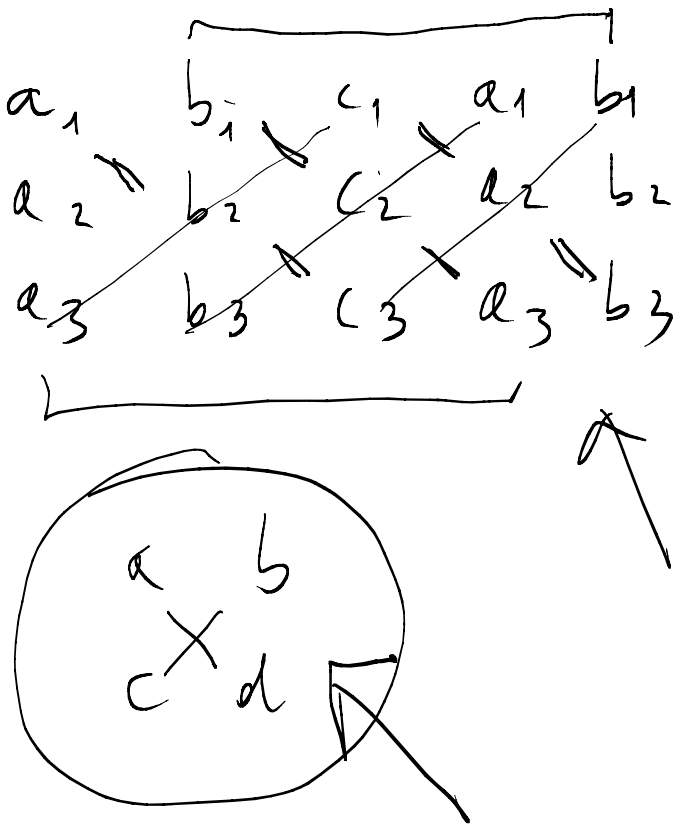
Note Title 12/14/2020

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

$$\begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix} = 1 \cdot 5 \cdot 9 + 2 \cdot 6 \cdot 7 + 4 \cdot 8 \cdot 3 - \left(3 \cdot 5 \cdot 7 + 2 \cdot 4 \cdot 9 + 6 \cdot 8 \cdot 1 \right)$$

$$\begin{vmatrix} 1 & -1 & 3 \\ 2 & 0 & 1 \\ 1 & 2 & -1 \end{vmatrix} = \left(1 \cdot 0 \cdot (-1) + (-1) \cdot 1 \cdot 1 + 2 \cdot 2 \cdot 3 \right) - \left(1 \cdot 0 \cdot 3 + 2 \cdot (-1)(-1) + 2 \cdot 1 \cdot 1 \right)$$



$= (a_1 b_2 c_3 + b_1 c_2 a_3 + c_1 a_2 b_3) -$

$-($

3X3

$a=(a_1\ a_2\ a_3)$, $b=(b_1\ b_2\ b_3) \in \mathbb{R}^3$

$\langle a, b \rangle^{\perp}$ $\qquad (x, y, z)$

$$\begin{cases} (a_1, a_2, a_3)(x, y, z) = 0 \\ (b_1, b_2, a_3)(x, y, z) = 0 \end{cases} \qquad \begin{cases} a_1 x + a_2 y + a_3 z = 0 \\ b_1 x + b_2 y + b_3 z = 0 \end{cases}$$

$$\begin{vmatrix} a_1 & a_2 \\ b_1 & b_2 \end{vmatrix} \neq 0 \qquad \begin{cases} a_1 x + a_2 y = -a_3 z \\ b_1 x + b_2 y = -b_3 z \end{cases}$$

$$x = \frac{\begin{vmatrix} -a_3 z & a_2 \\ -b_3 z & b_2 \end{vmatrix}}{\begin{vmatrix} a_1 & a_2 \\ b_1 & b_2 \end{vmatrix}} =$$

$$\to \begin{vmatrix} a_1 & a_2 \\ b_1 & b_2 \end{vmatrix}^{-1} (-z) \begin{vmatrix} a_3 & a_2 \\ b_3 & b_2 \end{vmatrix} = z \begin{vmatrix} a_1 & a_2 \\ b_1 & b_2 \end{vmatrix}^{-2} \begin{vmatrix} a_2 & a_3 \\ b_2 & b_3 \end{vmatrix}$$

$$y = \begin{vmatrix} a_1 & a_2 \\ b_1 & b_2 \end{vmatrix}^{-1} \begin{vmatrix} a_1 & -a_3 z \\ b_1 & -b_3 z \end{vmatrix} = -z \begin{vmatrix} a_1 & a_2 \\ b_1 & b_2 \end{vmatrix}^{-1} \begin{vmatrix} a_1 & a_3 \\ b_1 & b_3 \end{vmatrix}$$

$$\overline{z} = \begin{vmatrix} a_1 & a_2 \\ b_1 & b_2 \end{vmatrix}$$ la stessa coniugata del sistema è

$$\left(\begin{vmatrix} a_2 & a_3 \\ b_2 & b_3 \end{vmatrix}, -\begin{vmatrix} a_1 & a_3 \\ b_1 & b_3 \end{vmatrix}, \begin{vmatrix} a_1 & a_2 \\ b_1 & b_2 \end{vmatrix} \right) = a \times b$$

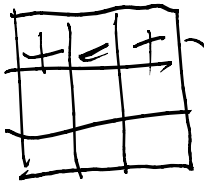
Al_2.1

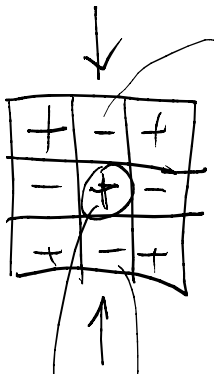
SVILUPPO DI LAPLACE

$$\begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix} =$$

+	−	+	−
−	+	−	+
+	−	+	−
−	+	−	+

$$a_{11} \begin{vmatrix} a_{22} & a_{23} \\ a_{32} & a_{33} \end{vmatrix} - a_{12} \begin{vmatrix} a_{21} & a_{23} \\ a_{31} & a_{33} \end{vmatrix} + a_{13} \begin{vmatrix} a_{21} & a_{22} \\ a_{31} & a_{32} \end{vmatrix}$$



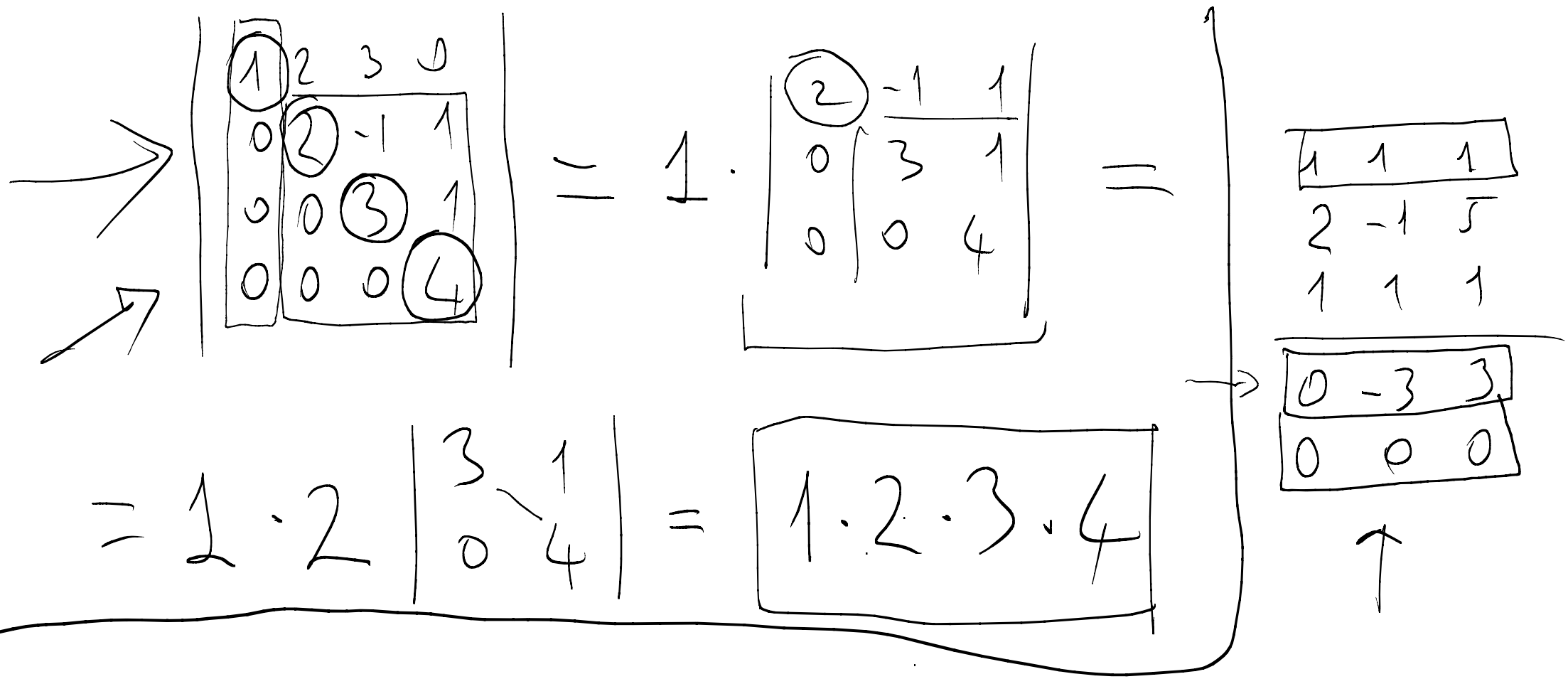


$$\begin{vmatrix} -1 & 0 & 2 \\ 2 & 3 & -2 \\ 1 & 2 & 1 \end{vmatrix} =$$

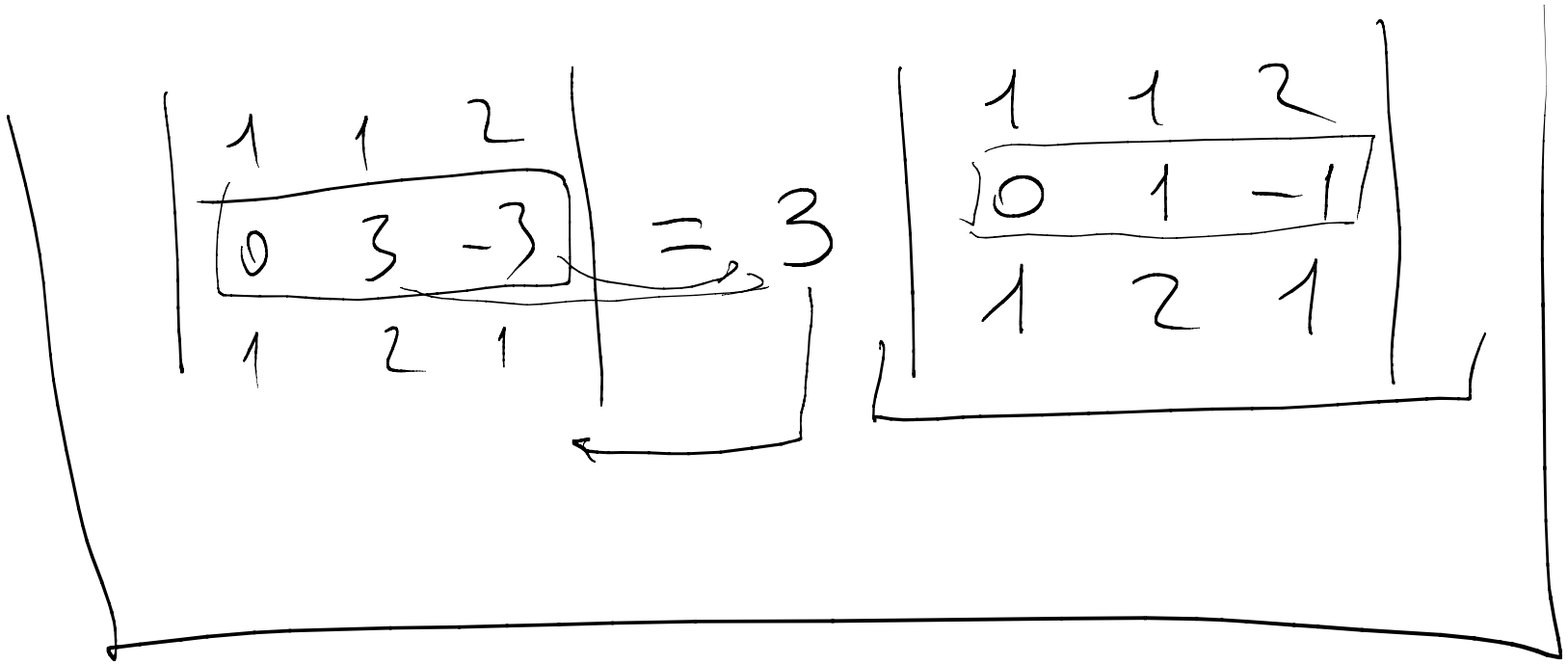
bc

$$= -0 \begin{vmatrix} 2 & -2 \\ 1 & 1 \end{vmatrix} + 3 \begin{vmatrix} -1 & 2 \\ 1 & 1 \end{vmatrix} - 2 \begin{vmatrix} -1 & 2 \\ 2 & -2 \end{vmatrix} =$$

$$= 3(-1-3) - 2(2-4) = \dots$$



$$\begin{vmatrix} 1 & 1 & 1 \\ 2 & -1 & 5 \\ 1 & 1 & 1 \end{vmatrix} = 0$$


1 1 2
0 3 -3
1 2 1
= 3
1 1 2
0 1 -1
1 2 1