

$$A = \begin{pmatrix} 2 & 3 \\ 7 & 5 \end{pmatrix} \quad B = \begin{pmatrix} 1 & 2 & 4 \\ 3 & 5 & 7 \\ 0 & -1 & 1 \end{pmatrix} \quad C = \begin{pmatrix} 12 & -87 \\ 05 & 75 \\ 00 & 81 \\ 00 & 010 \end{pmatrix}$$

$$\det(A) = 2 \cdot 5 - 3 \cdot 7 = -11$$

Regel von Sarrus $\det(B) = 5 + 0 + (-12) - 0 - 6 - (-7) = -6$

Dreiecks-
matrix: $\det(C) = \det \begin{pmatrix} 1 & * & * & * \\ 0 & 5 & * & * \\ 0 & 0 & 8 & * \\ 0 & 0 & 0 & 10 \end{pmatrix} = 1 \cdot 5 \cdot 8 \cdot 10 = 400$

Blockmatrix: $\det(D) = \det \begin{pmatrix} A & * & * & * \\ 0 & * & * & * \\ 0 & * & * & * \\ 0 & * & * & B \end{pmatrix} = \det(A) \cdot \det(B) = -11 \cdot (-6) = 66$

25) $A = \begin{pmatrix} 4 & 0 & 6 & 3 \\ 0 & 0 & 1 & 0 \\ 2 & 0 & -5 & -3 \\ 7 & 1 & -3 & -2 \end{pmatrix} \leftarrow$

$$(-1)^{1+4} \cdot 3 \cdot \det \begin{pmatrix} 0 & 0 & 4 \\ 2 & 0 & -5 \\ 7 & 1 & -3 \end{pmatrix} + (-1)^{3+4} \cdot (-3) \cdot \det \begin{pmatrix} 4 & 0 & 6 \\ 0 & 0 & 4 \\ 7 & 1 & -3 \end{pmatrix} +$$

$$(-1)^{4+4} \cdot (-1) \cdot \det \begin{pmatrix} 4 & 0 & 6 \\ 0 & 0 & 4 \\ 2 & 0 & -3 \end{pmatrix}$$

$$\det(A) = (-1)^{1+2} \cdot 1 \cdot \det \begin{pmatrix} 4 & 6 & 3 \\ 0 & 1 & 0 \\ 2 & -5 & -3 \end{pmatrix} \leftarrow =$$

$$(-1)^{2+2} \cdot 4 \cdot \det \begin{pmatrix} 4 & 3 \\ 2 & -3 \end{pmatrix} =$$

$$4 \cdot (-12 - 6) = 4 \cdot (-18) = -72$$

$$B = \begin{pmatrix} 4 & 3 & 2 & 1 \\ 3 & 2 & 1 & 4 \\ 2 & 1 & 4 & 3 \\ 1 & 4 & 3 & 2 \end{pmatrix} \begin{matrix} \leftarrow \\ \leftarrow \\ \leftarrow \\ \leftarrow \end{matrix} \begin{matrix} -3 \\ -2 \\ -4 \\ -4 \end{matrix} \rightsquigarrow \begin{pmatrix} 0 & -13 & -10 & -7 \\ 0 & -10 & -8 & -2 \\ 0 & -7 & -4 & -1 \\ 1 & 4 & 3 & 2 \end{pmatrix}$$

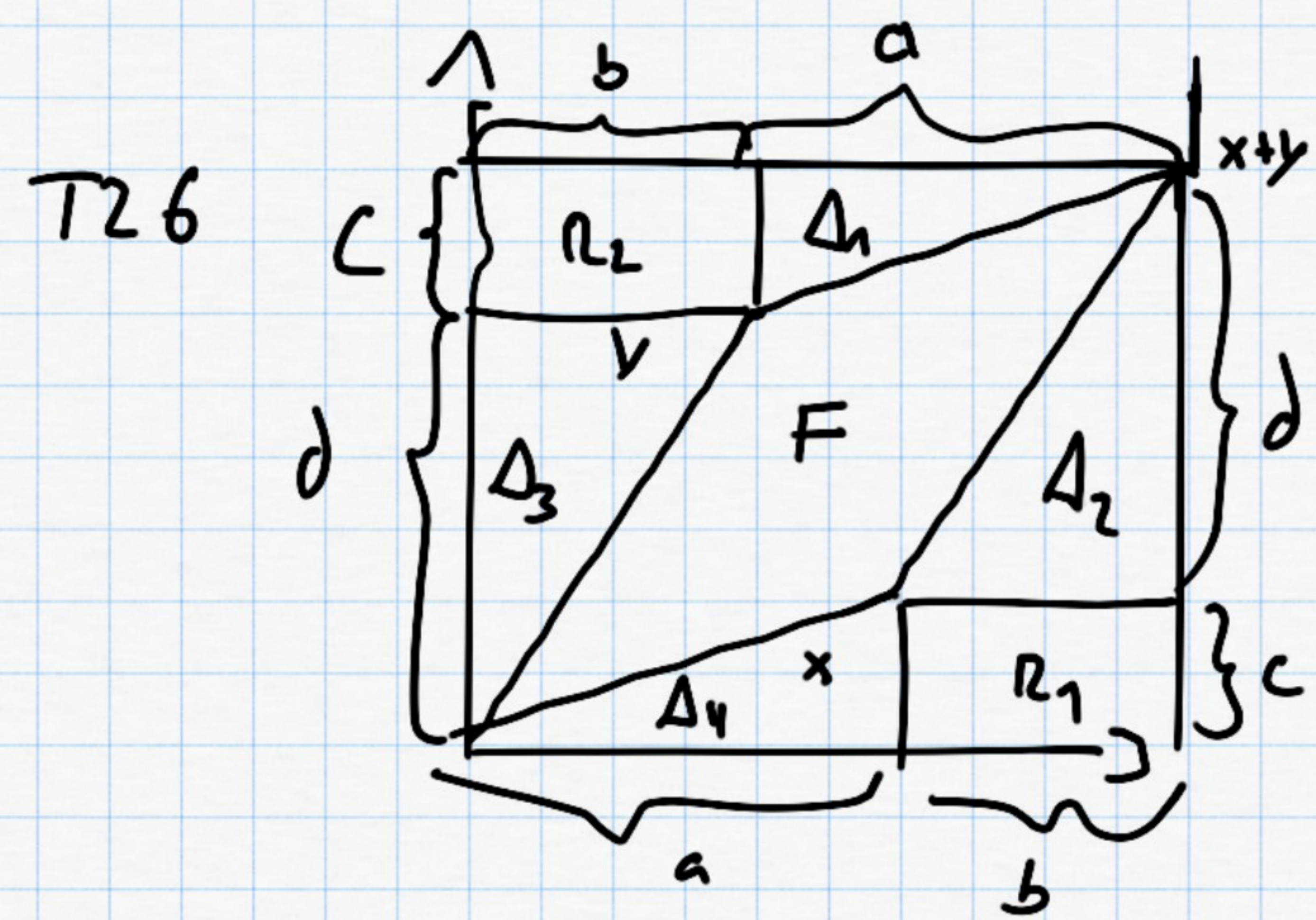
$$\det(B) = (-1)^{4+1} \cdot 1 \cdot \det \begin{pmatrix} -13 & -10 & -7 \\ -10 & -8 & -2 \\ -7 & -2 & -1 \end{pmatrix} =$$

$$(-1) \cdot \det \begin{pmatrix} 3 & 6 & 4 & -7 \\ 4 & -4 & -4 & -1 \\ 0 & 0 & -1 & - \end{pmatrix} = (-1) \cdot (-1)^{3+3} \cdot (-1) \cdot \det \begin{pmatrix} 3 & 6 & 4 \\ 4 & -4 & -4 \end{pmatrix} \begin{matrix} 1:4 \\ 4:4 \end{matrix}$$

$$4^2 \cdot \det \begin{pmatrix} 9 & 1 \\ 1 & -1 \end{pmatrix} = 16 \cdot (9 \cdot (-1) - 1 \cdot 1) = 16 \cdot (-10) = -160$$

$$C = \frac{1}{2} \cdot B : \det \left(\frac{1}{2} \cdot B \right) = \frac{1}{2}^4 \cdot \det(B) = \frac{1}{16} \cdot (-160) = -10$$

$$D = A^T \cdot C^2 : \det(A^T \cdot C^2) = \det(A) \cdot \det(C)^2 = -72 \cdot 100 = -7200$$



$$\begin{aligned}
 F &= (a+b) \cdot (c+d) - R_1 - R_2 - \Delta_1 - \Delta_2 - \Delta_3 - \Delta_4 \\
 &= (a+b) \cdot (c+d) - cb - cb - \frac{1}{2}ac - \frac{1}{2} \cdot bd \cdot \frac{1}{2}bd - \frac{1}{2}ac \\
 &= ac + cd + bc + bd - 2cb - ac - bd \\
 &= ad - bc = |\det(x|y)|
 \end{aligned}$$