$$A=\begin{pmatrix}2&3\\7&5\end{pmatrix} \quad B=\begin{pmatrix}1&2&4\\3&5&7\\0&-1&1\end{pmatrix} \quad C=\begin{pmatrix}1&2&-8&7\\0&5&7&5\\0&0&8&1\\0&0&0&10\end{pmatrix}$$

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

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

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

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

25)

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

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

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

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

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

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

$$B = \begin{pmatrix} 4 & 3 & 2 & 1 \\ 3 & 2 & 1 & 4 \\ 2 & 1 & 4 & 3 \\ 1 & 4 & 3 & 2 \end{pmatrix} \begin{matrix} \\ \\ -2 \\ -3 \end{matrix} \quad -4 \sim \begin{pmatrix} 0 & -13 & -10 & -7 \\ 0 & -10 & -8 & -2 \\ 0 & -7 & -5 & -1 \\ 1 & 4 & 3 & 2 \end{pmatrix}$$

-7 $\cdot(-1)$

$$\det(B) = (-1)^{4+1} \cdot 1 \cdot \det\left(\begin{pmatrix} -13 & -10 & -7 \\ -10 & -8 & -2 \\ -7 & -5 & -1 \end{pmatrix}\right) =$$

$$(-1) \cdot \det\begin{pmatrix} 36 & 4 & -7 \\ 4 & -4 & -5 \\ 0 & 0 & -1 \end{pmatrix} \begin{matrix} \\ \\ \leftarrow \end{matrix} = (-1) \cdot (-1)^{3+3} \cdot (-1) \cdot \det\begin{pmatrix} 36 & 4 \\ 4 & -4 \end{pmatrix} \begin{matrix} \\ 1:4 \end{matrix} =$$

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

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

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

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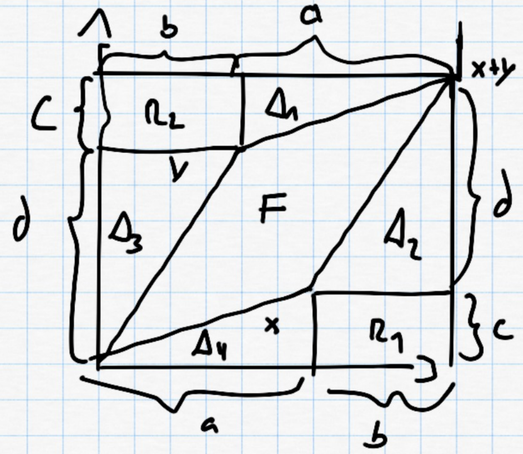

$$F = (a+b)\cdot(c+d) - R_1 - R_2 - \Delta_1 - \Delta_2 - \Delta_3 - \Delta_4$$

$$= (a+b)\cdot(c+d) - cb - cb - \frac{1}{2}ac - \frac{1}{2}\cdot bd \cdot \frac{1}{2}bd - \frac{1}{2}ac$$

$$= ac + ad + bc + bd - 2cb - ac - bd$$

$$= ad - bc = |\det(x \mid y)|$$