Topic 2. Example 14. The (2,3) cofactor of $A = \begin{pmatrix} 1 & 2 & 1 \\ -1 & -1 & 1 \\ 0 & 1 & 3 \end{pmatrix}$ is

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

Topic 2. Example 15. Using coset expansion for the third row,

$$\begin{aligned}
&\det \begin{pmatrix} 1 & 2 & 1 \\ -1 & 1 & 1 \\ 0 & 1 & 3 \end{pmatrix} \\
&= (-1)^{3+1} \cdot 0 \cdot \det \begin{pmatrix} 2 & 1 \\ 1 & 1 \end{pmatrix} + (-1)^{3+2} \cdot 1 \cdot \det \begin{pmatrix} 1 & 1 \\ -1 & 1 \end{pmatrix} + (-1)^{3+3} \cdot 3 \cdot \det \begin{pmatrix} 1 & 2 \\ -1 & 1 \end{pmatrix} \\
&= 0 + (-1) \cdot (1 \cdot 1 - (-1) \cdot 1) + 3 \cdot (1 \cdot 1 - (-1) \cdot 2) = -2 + 9 = 7.
\end{aligned}$$

Topic 2. Example 16. Using coset expansion for the fourth column,

$$\begin{aligned}
&\det \begin{pmatrix} 1 & -2 & 0 & 1 \\ 3 & 2 & 2 & 0 \\ 1 & 0 & 1 & 0 \\ 0 & -4 & 2 & 4 \end{pmatrix} \\
&= (-1)^{1+4} \cdot 1 \cdot \det \begin{pmatrix} 3 & 2 & 2 \\ 1 & 0 & 1 \\ 0 & -4 & 2 \end{pmatrix} + 0 + 0 + (-1)^{4+4} \cdot 4 \cdot \det \begin{pmatrix} 1 & -2 & 0 \\ 3 & 2 & 2 \\ 1 & 0 & 1 \end{pmatrix} \\
&= -\Big((-1)^{1+1} \cdot 3 \cdot \det \begin{pmatrix} 0 & 1 \\ -4 & 2 \end{pmatrix} + (-1)^{2+1} \cdot 1 \cdot \det \begin{pmatrix} 2 & 2 \\ -4 & 2 \end{pmatrix} + 0\Big) \\
&\qquad + 4\Big((-1)^{1+1} \cdot 1 \cdot \det \begin{pmatrix} 2 & 2 \\ 0 & 1 \end{pmatrix} + (-1)^{1+2} \cdot (-2) \cdot \det \begin{pmatrix} 3 & 2 \\ 1 & 1 \end{pmatrix} + 0\Big) \\
&= -3(0+4) + (4+8) + 4\big((2-0) + 2(2-3)\big) = -12 + 12 + 8 + 8 = 16.
\end{aligned}$$