$$\mathbf{A} = \begin{bmatrix} a & b \\ c & d \end{bmatrix} \quad \begin{array}{c|c} c & bc & ac/2 \\ \hline bd & bd & 2 \\ \hline ac/2 & bc & c \\ \hline a & b & \\ \end{array}$$

 $\det\left(\left|\begin{array}{cc} a & b \\ c & d \end{array}\right|\right) = (a+b)(c+d) - ac - bd - 2bc = ad - bc$