

$$A = \begin{bmatrix} 0 & 0 & a_1 & b_1 \\ 0 & 0 & a_r & b_r \\ a_r & b_r & 0 & 0 \\ a_\Sigma & b_\Sigma & 0 & 0 \end{bmatrix}$$

$$B = \begin{bmatrix} a_1 & 0 & 0 & b_1 \\ 0 & a_r & b_r & 0 \\ 0 & b_r & a_r & 0 \\ b_\Sigma & 0 & 0 & a_\Sigma \end{bmatrix}$$

$$\det(A) = 0(-1)^{1+1} \begin{vmatrix} 0 & a_r & b_r \\ b_r & 0 & 0 \\ b_\Sigma & 0 & 0 \end{vmatrix} + 0(-1)^{r+1} \begin{vmatrix} 0 & a_1 & b_1 \\ b_r & 0 & 0 \\ b_\Sigma & 0 & 0 \end{vmatrix} + a_r(-1)^{r+1} \begin{vmatrix} 0 & a_1 & b_1 \\ 0 & a_r & b_r \\ b_\Sigma & 0 & 0 \end{vmatrix}$$

$$+ a_\Sigma(-1)^{\Sigma+1} \begin{vmatrix} 0 & a_1 & b_1 \\ 0 & a_r & b_r \\ b_r & 0 & 0 \end{vmatrix} = a_r \left[ b_\Sigma(-1)^{r+1} \begin{vmatrix} a_1 & b_1 \\ a_r & b_r \end{vmatrix} \right] - a_\Sigma \left[ b_r \begin{vmatrix} a_1 & b_1 \\ a_r & b_r \end{vmatrix} \right]$$

$$\det(A) = a_r b_\Sigma (a_1 b_r - a_r b_1) - a_\Sigma b_r (a_1 b_r - a_r b_1) = (a_1 b_r - a_r b_1) (a_r b_\Sigma - a_\Sigma b_r)$$

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$$\det(B) = a_1 (-1)^{1+1} \begin{vmatrix} a_r & b_r & 0 \\ b_r & a_r & 0 \\ 0 & 0 & a_\varepsilon \end{vmatrix} + 0 + 0 + b_\varepsilon (-1)^{\varepsilon+1} \begin{vmatrix} 0 & 0 & b_1 \\ a_r & b_r & 0 \\ b_r & a_r & 0 \end{vmatrix}$$

$$\det(B) = a_1 \left[ a_\varepsilon (-1)^{1+1} \begin{vmatrix} a_r & b_r \\ b_r & a_r \end{vmatrix} \right] - b_\varepsilon \left[ b_1 (-1)^{1+1} \begin{vmatrix} a_r & b_r \\ b_r & a_r \end{vmatrix} \right]$$

$$\det(B) = a_1 a_\varepsilon (a_r b_r - b_r b_r) - b_\varepsilon b_1 (a_r a_r - b_r b_r)$$

$$\det(B) = (a_r a_r - b_r b_r) (a_1 a_\varepsilon - b_1 b_\varepsilon)$$