

$$\begin{aligned}
 \mathbf{a} \times \mathbf{b} &= \det \begin{bmatrix} \hat{i} & \hat{j} & \hat{k} \\ 3 & 2 & 1 \\ 6 & 4 & 2 \end{bmatrix} = \hat{i} \det \begin{bmatrix} \cancel{3} & \cancel{\hat{j}} & \cancel{\hat{k}} \\ \cancel{6} & 4 & 2 \end{bmatrix} - \hat{j} \det \begin{bmatrix} \cancel{3} & \cancel{\hat{j}} & \cancel{\hat{k}} \\ 6 & \cancel{4} & 2 \end{bmatrix} + \hat{k} \det \begin{bmatrix} \cancel{3} & \cancel{\hat{j}} & \cancel{\hat{k}} \\ 6 & 4 & \cancel{2} \end{bmatrix} \\
 &= \hat{i} (2 \times 2 - 1 \times 4) - \hat{j} (3 \times 2 - 1 \times 6) + \hat{k} (3 \times 4 - 2 \times 6) = \mathbf{0}
 \end{aligned}$$