$$\mathbf{a}\times\mathbf{b}=\det\begin{bmatrix}\hat{\boldsymbol{\imath}} & \hat{\boldsymbol{\jmath}} & \hat{\mathbf{k}}\\ 1 & 2 & 3\\ 1 & -1 & 2\end{bmatrix}=\hat{\boldsymbol{\imath}}\det\begin{bmatrix}\cancel{\hat{\boldsymbol{\imath}}} & \cancel{\hat{\boldsymbol{\jmath}}} & \cancel{\hat{\mathbf{k}}}\\ \cancel{1} & 2 & 3\\ \cancel{1} & -1 & 2\end{bmatrix}-\hat{\boldsymbol{\jmath}}\det\begin{bmatrix}\cancel{\hat{\boldsymbol{\imath}}} & \cancel{\hat{\boldsymbol{\jmath}}} & \cancel{\hat{\mathbf{k}}}\\ 1 & \cancel{2} & 3\\ 1 & \cancel{-1} & 2\end{bmatrix}+\hat{\mathbf{k}}\det\begin{bmatrix}\cancel{\hat{\boldsymbol{\imath}}} & \cancel{\hat{\boldsymbol{\jmath}}} & \cancel{\hat{\mathbf{k}}}\\ 1 & 2 & \cancel{3}\\ 1 & -1 & \cancel{2}\end{bmatrix}$$

$$=\hat{\boldsymbol{\imath}}\{2\times 2-3\times(-1)\}-\hat{\boldsymbol{\jmath}}\{1\times 2-3\times 1\}+\hat{\mathbf{k}}\{1\times(-1)-2\times 1\}$$

$$=7\hat{\boldsymbol{\imath}}+\hat{\boldsymbol{\jmath}}-3\hat{\mathbf{k}}$$