

Find the value of the determinant $\begin{vmatrix} 3 & 1 & -1 & 2 & 1 \\ 0 & 3 & 1 & 4 & 2 \\ 1 & 4 & 2 & 3 & 1 \\ 5 & -1 & -3 & 2 & 5 \\ -1 & 1 & 2 & 3 & 2 \end{vmatrix}$. [88 交大機械乙 3(a)]

[解] $\xrightarrow{R_{31}(-3); R_{34}(-5); R_{35}(1)} \begin{vmatrix} 0 & -11 & -7 & -7 & -2 \\ 0 & 3 & 1 & 4 & 2 \\ 1 & 4 & 2 & 3 & 1 \\ 0 & -21 & -13 & -13 & 0 \\ 0 & 5 & 4 & 6 & 3 \end{vmatrix} = \begin{vmatrix} -11 & -7 & -7 & -2 \\ 3 & 1 & 4 & 2 \\ -21 & -13 & -13 & 0 \\ 5 & 4 & 6 & 3 \end{vmatrix}$

$\xrightarrow{R_{21}(7); R_{23}(13); R_{24}(-4)} \begin{vmatrix} 10 & 0 & 21 & 12 \\ 3 & 1 & 4 & 2 \\ 18 & 0 & 39 & 26 \\ -7 & 0 & -10 & -5 \end{vmatrix} = \begin{vmatrix} 10 & 21 & 12 \\ 18 & 39 & 26 \\ -7 & -10 & -5 \end{vmatrix}$

$= -1950 - 2160 - 3822 + 3276 + 2600 + 1890 = -166$