

$C_3 \leftarrow C_3 - C_2$

$$\begin{vmatrix} 2 & 0 & 4 & 2 \\ 5 & 2 & 7 & 5 \\ 2 & 5 & 5 & 2 \end{vmatrix} = 2 \begin{vmatrix} 1 & 0 & 2 & 1 \\ 5 & 2 & 7 & 5 \\ 2 & 5 & 5 & 2 \end{vmatrix} = 2 \begin{vmatrix} 2 \times (-1) & 5 & 2 & 1 \\ 2 & 5 & 5 & 2 \\ 2 & 5 & 5 & 2 \end{vmatrix} + 5 \times (-1) \begin{vmatrix} 2 & 5 & 2 \\ 2 & 5 & 5 \end{vmatrix} + 2 \times 5 \times 5$$

$$= 2 \left(1 \times (-1) \begin{vmatrix} 2 & 5 \\ 2 & 5 \end{vmatrix} + 2 \times (-1) \begin{vmatrix} 5 & 2 \\ 2 & 5 \end{vmatrix} \right) = 2(-25 + 2(25 - 4))$$

$$\begin{matrix} C_1 \leftarrow C_1 - C_3 \\ C_2 \leftarrow C_2 - C_3 \end{matrix} \begin{vmatrix} -1 & 0 & 2 & 0 \\ 0 & 2 & 5 & 0 \\ 2 & 5 & 5 & 0 \end{vmatrix} = 2 \begin{pmatrix} -1 \times 2 \times 0 + 0 \times 5 \times 2 + 0 \times 5 \times 2 \\ -2 \times 2 \times 2 - (1) \times 5 \times 5 - 0 \end{pmatrix}$$

$C_4 \leftarrow C_4 - C_1$ $C_3 \leftarrow C_3 - C_1$ $C_4 \leftarrow C_4 - C_1$

$$\begin{vmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{vmatrix} = \begin{vmatrix} 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 1 & -2 & -2 & -2 \\ 1 & 0 & 0 & -2 \end{vmatrix}$$

$$= 1 \times (-2) \times 3$$

$C_3 \leftarrow C_3 + 10C_2 + 100C_1$

$$4.2. \begin{vmatrix} 1 & 2 & 1 & 2 \\ 1 & 1 & 2 & 3 \\ 0 & 3 & 9 & 9 \\ 1 & 2 & 1 & 2 \end{vmatrix} = \begin{vmatrix} 1 & 2 & 1 & 2 \\ 1 & 1 & 2 & 3 \\ 0 & 3 & 9 & 9 \\ 0 & 2 & 0 & 0 \end{vmatrix} = 11^2 \begin{vmatrix} 1 & 2 & 1 & 2 \\ 1 & 1 & 2 & 3 \\ 0 & 3 & 9 & 9 \\ 0 & 2 & 0 & 0 \end{vmatrix} = 11^2 \begin{vmatrix} 1 & 2 & 1 & 2 \\ 0 & -1 & 1 & 1 \\ 0 & 3 & 9 & 9 \\ 0 & 2 & 0 & 0 \end{vmatrix}$$

$L_2 \leftarrow L_2 - L_1$

$$= 99 \begin{vmatrix} 1 & 2 & 1 & 2 \\ 0 & -1 & 1 & 1 \\ 0 & 3 & 9 & 9 \\ 0 & 2 & 0 & 0 \end{vmatrix} = 99 \begin{vmatrix} 1 & 2 & 1 & 2 \\ 0 & -1 & 1 & 1 \\ 0 & 1 & 1 & 1 \\ 0 & 2 & 0 & 0 \end{vmatrix} = 99 \begin{vmatrix} 1 & 2 & 1 & 2 \\ 0 & -1 & 1 & 1 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & -2 & -2 \end{vmatrix}$$

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