Notes

103.01 New Year identities for 2019

$$2018 + 1 = 2019;$$

$$2018\begin{vmatrix} 1 & -1 & 0 \\ 1 & 2\times 2018 & -1 \\ 0 & 1 & 2 \end{vmatrix}^2 + 1 = 2019\begin{vmatrix} 2\times 2018 & -1 \\ 1 & 2 \end{vmatrix}^2;$$

$$2018\begin{vmatrix} 1 & -1 & 0 & 0 & 0 \\ 1 & 2\times 2018 & -1 & 0 & 0 \\ 0 & 1 & 2 & -1 & 0 \\ 0 & 0 & 1 & 2\times 2018 & -1 \\ 0 & 0 & 0 & 1 & 2 \end{vmatrix}^2 + 1$$

$$= 2019\begin{vmatrix} 2\times 2018 & -1 & 0 & 0 \\ 1 & 2 & -1 & 0 \\ 0 & 1 & 2\times 2018 & -1 \\ 0 & 0 & 1 & 2 \end{vmatrix}^2;$$

$$2018\begin{vmatrix} 1 & -1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 2\times 2018 & -1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 2 & -1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 2\times 2018 & -1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 2 & -1 & 0 \\ 0 & 0 & 0 & 0 & 1 & 2\times 2018 & -1 \\ 0 & 0 & 0 & 0 & 0 & 1 & 2 \end{vmatrix}^2 + 1 =$$

$$= 2019\begin{vmatrix} 2\times 2018 & -1 & 0 & 0 & 0 & 0 \\ 1 & 2 & -1 & 0 & 0 & 0 \\ 0 & 1 & 2\times 2018 & -1 & 0 & 0 \\ 0 & 0 & 1 & 2 & -1 & 0 \\ 0 & 0 & 0 & 1 & 2\times 2018 & -1 \\ 0 & 0 & 0 & 0 & 1 & 2 \end{vmatrix}^2.$$

And the pattern continues forever.

The proof is left to the interested reader.

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