

ODD-POWER IDENTITY VIA MULTIPLICATION OF CERTAIN MATRICES

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ABSTRACT. In this manuscript, we show an odd-power identity in terms of certain matrix multiplication. More precisely, the matrix of dimension 1×1 such that $a_{1,1} = N^{2M+1}$ is result of multiplication of the three matrices $\mathbf{J}_N \times \mathbf{K}_{N,M} \times \mathbf{T}_M$

$$\begin{bmatrix} N^{2M+1} \end{bmatrix} = \mathbf{J}_N \times \mathbf{K}_{N,M} \times \mathbf{T}_M$$

where \mathbf{J}_N is unit row vector of dimension $1 \times N$; $\mathbf{K}_{N,M}$ is a matrix of dimension $N \times M$, and \mathbf{T}_M is a column vector of size $M \times 1$.

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DEFINITIONS

- \mathbf{J}_N – unit row vector of all 1's having the dimension $1 \times N$. For example,

$$\mathbf{J}_5 = \begin{bmatrix} 1 & 1 & 1 & 1 & 1 \end{bmatrix}$$

- $\mathbf{K}_{N,M}$ – matrix of dimension $N \times M$ defined by

$$\mathbf{K}_{N,M} = (k^r (N - k)^r)_{0 \leq k \leq N, 0 \leq r \leq M}$$

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- \mathbf{T}_M – column vector of dimension $M \times 1$ defined by

$$\mathbf{T}_M = (\mathbf{A}_{M,r})_{M=\text{const}, 0 \leq r \leq M}$$

where $\mathbf{A}_{M,r}$ is a rational coefficient (literature). For example,

1. MAIN THEOREM

2. CONCLUSIONS

Conclusions of your manuscript.

REFERENCES

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