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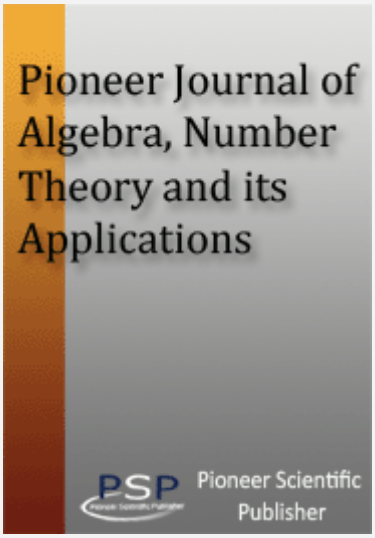

DETERMINANTS AND PERMANENTS OF MATRICES FROM FIBONACCI AND LUCAS NUMBERS

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Abstract

In this paper, we continue to study from (Z. Čerin, On Diophantine triples from Fibonacci and Lucas numbers, (preprint)), for $k = -1$ and $k = 5$, the infinite sequences of triples $A = (F_{2n+1}, F_{2n+3}, F_{2n+5})$, $B = (F_{2n+1}, 5F_{2n+3}, F_{2n+5})$, $C = (L_{2n+1}, L_{2n+3}, L_{2n+5})$, $D = (L_{2n+1}, 5L_{2n+3}, L_{2n+5})$ with the property that the product of any two different components of them increased by k are squares. The sequences A and B are built from the Fibonacci numbers F_n while the sequences C and D from the Lucas numbers L_n. We show many interesting properties of various matrices with rows from these sequences and give methods how to compute some of their generalized determinants and permanents. We also study numerous tetrahedra with vertices from these sequences concentrating on their volumes and centroids. Some of our theorems have versions for the associated sequences $\tilde{A} = (F_{2n+4}, F_{2n+3}, F_{2n+2})$, $\tilde{B} = (L_{2n+4}, F_{2n+3}, L_{2n+2})$, $\tilde{C} = (L_{2n+4}, L_{2n+3}, L_{2n+2})$ and $\tilde{D} = (5F_{2n+4}, L_{2n+3}, 5F_{2n+2})$.

Keywords and phrases: Fibonacci and Lucas numbers, determinant, generalized determinant, permanent, tetrahedron, volume, centroid.