ON LUCAS NUMBERS BY
THE MATRIX METHOD

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Abstract
In this study we define the Lucas $Q_L$-matrix similar to the Fibonacci $Q$-matrix. The Lucas $Q_L$-matrix is different from the Fibonacci $Q$-matrix, but is related to it. Using this matrix representation, we have found some well-known equalities and a Binet-like formula for the Lucas numbers.

Keywords: Fibonacci numbers, Lucas numbers, Matrix method.
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1. Introduction
Fibonacci and Lucas numbers and their generalization have many interesting properties and applications to almost every field of science and art. For the prettiness and rich applications of these numbers and their relatives to science and nature one can see [1-5].

As in [4], let $Q$ be the $2 \times 2$ matrix
\[
Q = \begin{bmatrix}
1 & 1 \\
1 & 0
\end{bmatrix}.
\]
Then for an integer $n$ with $n \geq 1$, $Q^n$ has the form
\[
Q^n = \begin{bmatrix}
F_{n+1} & F_n \\
F_n & F_{n-1}
\end{bmatrix}.
\]
This property provides an alternate proof of Cassini’s Fibonacci formula:
\[
F_{n-1}F_{n+1} - F_n^2 = (-1)^n.
\]

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