Problem No. 12 (Fall 2004 Series)

Let \(a, b, c, d,\) and \(c_n (n = 0, 1, 2, \ldots)\) be complex numbers such that \(d \neq 0\) and

\[
\frac{az + b}{z^2 + cz + d} = c_0 + c_1 z + c_2 z^2 + \cdots + c_n z^n + \ldots
\]

for \(|z|\) small enough.

Show that

\[
\frac{\det \begin{pmatrix} c_n & c_{n+1} \\ c_{n+1} & c_{n+2} \end{pmatrix}}{\det \begin{pmatrix} c_{n+1} & c_{n+2} \\ c_{n+2} & c_{n+3} \end{pmatrix}}
\]

is independent of \(n\).