

$$D(3) = - \begin{vmatrix} 0 & a_{12} & a_{13} \\ a_{21} & a_{22} - 1 & a_{23} \\ a_{31} & a_{32} & a_{33} - 1 \end{vmatrix} \cong a_{21}a_{33} - a_{21} - a_{23}a_{31} - a_{13}a_{21}a_{32} \\ + a_{13}a_{22}a_{31} - a_{13}a_{31}.$$

Each term here has the sign preceding it, as all factors are positive. Given a_{ij} with $i \neq j$, we can take a_{22} and/or a_{33} so large that the positive terms dominate, since these factors occur only in positive terms. Thus we reach a contradiction of the inequality for $n = 3$, $a_{11} = 1$.



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