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EX.2.4.10.a, Sauer3

Assume that $A=(a_{ij})$ is a $n\times n$ matrix with entries $|a_{ij}|\leq 1$ for all $1\leq i,j\leq n$. Prove that the matrix $U=(u_{ij})$ in its PA=LU factorization satisfies $|u_{ij}|\leq 2^{n-1}$ for all $1\leq i,j\leq n$.