MATH ANALYSIS

In a numerical analysis class I was assigned a homework problem that I struggled to solve. It was a mathematical proof. I knew which theorems I wanted to include that would prove what I needed to prove. However,I couldn't quite figure out how to tie together these theorems along with the given information. So, I wrote everything down on post-it notes and rearranged them using TOC methods until the steps of the proof were in a logical order. The TOC process helped me write up the proof for which I received full credit.

I. If we have an upper or lower triangular matrix with no diagonal elements equal to zero, and a determinant of a triangular matrix is equal to the product of diagonal elements, then the determinant of the matrix is nonzero, because a product
of nonzero numbers is nonzero. If the determinant of a matrix is nonzero and matrices with nonzero determinants are nonsingular, then the matrix is nonsingular.

THEREFORE, If we have an upper or lower triangular matrix with no diagonal elements equal to zero, then the matrix is nonsingular.

II. If we have an upper or lower triangular matrix that is nonsingular, and nonsingular matrices have a nonzero determinant, then we have a triangular matrix has a nonzero determinant. If we have a triangular matrix that has a nonzero determinant, and the determinant of a triangular matrix is equal to the product of diagonal elements, then no diagonal elements are zero, because a nonzero number is always the product of nonzero numbers.

THEREFORE, if we have an upper or lower triangular matrix that
is nonsingular, then no diagonal elements are zero.

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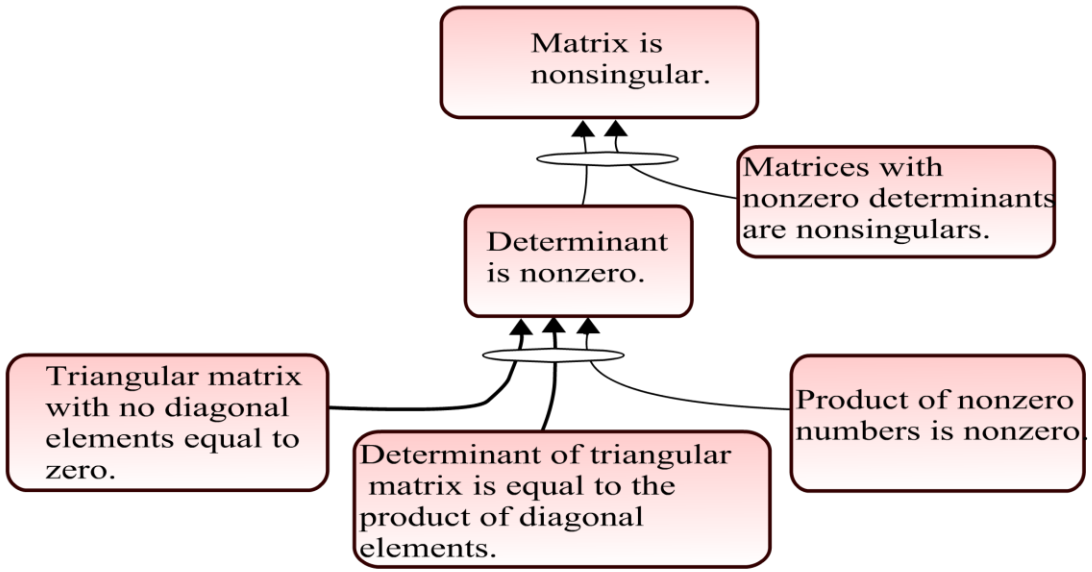
Prove that an upper or lower triangular matrix is nonsingular if and only if its diagonal elements are all different from 0.



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