Step-1

Consider the following formula for the determinant of A.

$\det A = \pm \det L \det D \det U$

Since $\det L = 1$ and $\det U = 1$, we have det A = Product of the Pivots of A.

Step-2

For obtaining the pivots of A, we will be performing the row operations on the matrix A,

Consider i^{th} row and j^{th} row. Suppose both of them have 1 in their k^{th} column. Let us perform the operation, row i minus row j.

This will create a 0 in the k^{th} column of i^{th} row. Suppose i^{th} row has â€“1 in the m^{th} column. Now m^{th} column of j^{th} row will contain either a 0 or a â€“1. Thus, m^{th} column of i^{th} row either remains as â€“1 or becomes zero.

Thus, this row operation does not create more 1â€™s or â€“1â€™s in the i^{th} row.

Step-3

Consider again i^{th} row and j^{th} row. Suppose i^{th} row has 1 and j^{th} row has â€“ 1 in their k^{th} column. Let us perform the operation, row i plus row j.

This will create a 0 in the k^{th} column of i^{th} row. Suppose i^{th} row has â€“1 in the m^{th} column. Now m^{th} column of j^{th} row will contain either a 0 or a 1. Thus, m^{th} column of i^{th} row either remains as â€“1 or becomes zero.

Thus, this row operation also does not create more 1â€™s or â€“1â€™s in the i^{th} row.

Step-4

Thus, the pivot elements of the determinant are from $\{-1, 0, 1\}$. Therefore, the determinant of A is either 1 or â€“1 or 0.