Conditions That Yield a Zero Determinant

If A is a square matrix and any one of the conditions below is true, then $det(A) = 0$.

(1) An entire row (or an entire coluumn) consists of zeros.

(2) Two rows (or columns) are equal.

(3) One row (or column) is a multiple of another row (or column).

Proof

If an entire row or column consists of zeros, then each cofactor in the expansion is multiplied by zero. When condition 2 or 3 is true, use elementary row or column operations to create row or column of zeros.