

Properties of the determinants

1. If B is obtained from A by multiplying a row (or a column) of A by a constant k then
$$\det B = k \det A.$$
2. If B is obtained from A by interchanging two rows (or columns) then $\det B = - \det A.$
3. If two rows of A are identical $\det A=0.$
4. Suppose that matrices $A_1, A_2,$ and B are identical except for the i th row and the i th row of B is the sum of the i th rows of A_1 and $A_2.$ Then $\det B = \det A_1 + \det A_2.$
5. If B is obtained from A by adding a constant multiple of one row to another one then
$$\det B = \det A.$$
6. The determinant of a triangular matrix is a equal to the product of its diagonal elements.
7. $\det A^T = \det A$

We can evaluate the determinant of a square matrix by reducing it to a triangular matrix using elementary row operations and picking up the factors coming from properties 1 and 2.