trace

Let A be an $n \times n$ matrix. The **trace** of A, denoted tr(A), is the sum of the diagonal elements of A. That is,

$$tr(A) = a_{11} + a_{22} + \dots + a_{nn}$$

Properties of trace:

$$\bullet tr(A + B) = tr(A) + tr(B)$$

$$\bullet tr(A - B) = tr(A) - tr(B)$$

•
$$tr(kA) = k \cdot tr(A)$$

•
$$tr(AB) = tr(BA)$$

•
$$tr(A^T) = tr(A)$$

The trace will come up again in reference to eigenvalues.

determinant

Let
$$A$$
 be an 2×2 matrix given as $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$.

The determinant of A, denoted by

$$det(A)$$
 or $|A| = \begin{vmatrix} a & b \\ c & d \end{vmatrix}$

is given by ad - bc.

All good, but what if n > 2?

Then we need to define matrix minor and matrix cofactor.