Symmetric Matrices, Real Eigenvalues, Orthogonal Eigenvectors

Symmetric Matrices

$$S^T = S$$

They have real λ and orthogonal x.

Antisymmetric matrices

$$A^T = -A$$

They have pure imaginary λ and orthogonal complex x.

Orthogonal matrices

$$Q^T Q = I$$

They have $|\lambda| = 1$ and orthogonal x.