- $m = n$ Same number of rows as columns.
- **Determinant**: $\det(A) = |A|$
- **Trace**: Sum of diagonal entries. $\text{tr}(A) = a_{11} + a_{22} + ... + a_{nn}$
- **Symmetric Matrix**: A square matrix such that $A = A^T$
  - The sum of symmetric matrices is also symmetric.
  - A symmetric matrix multiplied by a scalar is symmetric.
  - An inverse of a symmetric matrix is also symmetric, if it exists.
- **Skew-symmetric Matrix**: A square matrix such that $A = -A^T$
  - The sum of skew-symmetric matrices is also skew-symmetric.
  - A skew-symmetric matrix multiplied by a scalar is skew-symmetric.
  - An inverse of a skew-symmetric matrix is also skew-symmetric, if it exists.
- **Idempotent Matrix**: A square matrix such that $A^2 = A$.
  - Determinant is either 0 or 1
- **Nilpotent Matrix**: A square matrix such that $A^k = O$ for some *k*.
  - Zero entries along diagonal.
  - Determinant is 0.
- **Orthogonal Matrix**: A square matrix such that $A^{-1} = A^T$.
- **Diagonal Matrix**: All entries off the main diagonal are 0.
- **Triangular Matrix**
  - **Upper triangular**: All entries above the diagonal are 0
  - **Lower triangular**: All entries below the main diagonal is 0.
  - The transpose of upper triangular is lower triangular and vice versa.
  - The product of two upper triangular is upper triangular.
  - The product of two lower triangular is lower triangular.
  - Invertible iff diagonal entries are non-zero.
  - Inverse of upper triangular is upper triangular if it exists.
  - Inverse of lower triangular is lower triangular if it exists.
  - Determinant is the product of diagonal entries.