| | **Matrices** | |
|---|---|---|
| | **Real** | **Complex** |
| Symmetric | $A = A^T$<br>(is Normal) | $B = B^T$<br>BUT B might not be Normal |
| Anti-symmetric / skew symmetric (All Normal) | $A = -A^T$ | $A = -A^\dagger$<br>(Anti- / Skew- hermitian) |
| Self Adjoint | ≡ Symmetric | ≡ Hermitian |
| Hermitian<br>(All Normal) | ≡ Symmetric | $A = A^\dagger$<br>(implies symmetric, $A = A^T$) |
| Adjoint | N/A | N/A |
| Unitary<br>(All Normal) | $U^{-1} = U^T$<br>(Real U's are orthogonal) | $U^{-1} = U^\dagger$ |
| (Complex) Conjugate | Real if $A = A^*$ | $A^* = a_{ij}^*$ |
| Conjugate Transpose / hermitian conjugate / hermitian adjoint | $A^T$ | $A^\dagger = (A^T)^*$ |

Key: conjugate(A)= $A^*$ ; transpose(A)= $A^T$ ; conjugate transpose(A)= $A^\dagger$

- Matrix is normal if $[B, B^*]$ =0, ie $B, B^* commute$