

## REAL MATRICES WITH ORTHONORMAL COLUMNS

## Matrix notation

Let  $u_1 \ldots, u_k \in \mathbf{R}^n$ . Define  $U \in \mathbf{R}^{n \times k}$  so that

$$U = \left[ \begin{array}{cccc} u_1 & u_2 & \cdots & u_k \end{array} \right].$$

Then  $\{u_1,\ldots,u_k\}$  is an orthonormal set mean

$$U^{\top}U = I_k$$

Notice that if  $k < n, UU^{\top} \neq I$ , since its rank is at most k.

