## Sec. 1.6 Transposes and Symmetric Matrices

If $A = A^T$ then it is symmetric.

If $A = LU$ (i.e., $A$ is regular), and we multiply the rows of $U$ by a scalar factor, the reciprocals of the scalar factor can be saved in a matrix $D$. That is,

$$U = \begin{bmatrix} a & b \\ 0 & c \end{bmatrix} \Rightarrow DV = \begin{bmatrix} a & 0 \\ 0 & c \end{bmatrix} \begin{bmatrix} 1 & b/a \\ 0 & 1 \end{bmatrix}$$

If we further assume that $A$ is symmetric, then $V = L^T$ and $A = LDL^T$. We'll see more neat properties when we do Gram-Schmidt.

Also note that if $P$ is a permutation matrix, then $PP^T = I$.

$$P = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix} \Rightarrow P^T = \begin{bmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix} \Rightarrow PP^T$$