Practice: Construction of a Square Symmetric Matrix

Prove that $A^T A$ is symmetric.

$$A = \begin{bmatrix} 3 & 2 \\ 1 & 0 \end{bmatrix}$$

$$A^T A = \begin{bmatrix} 3 & 1 \\ 2 & 0 \end{bmatrix} \begin{bmatrix} 3 & 2 \\ 1 & 0 \end{bmatrix}$$

$$= \begin{bmatrix} 3 \cdot 3 + 1 \cdot 1 & 3 \cdot 2 + 1 \cdot 0 \\ 2 \cdot 3 + 0 \cdot 1 & 2 \cdot 2 + 0 \cdot 0 \end{bmatrix}$$

$$= \begin{bmatrix} 10 & 6 \\ 6 & 4 \end{bmatrix}$$