Additional Problems from Section 1.4

1. Prove: If $A \in M_n(\mathbb{R})$ is symmetric and A has n distinct eigenvalues, then A has n pairwise orthogonal eigenvectors.

2. Prove: If $x, y \in \mathbb{R}^2$, then $x^T y = ||x||\,||y|| \cos\theta$ where θ is the angle between x and y, and $||\cdot||$ denotes the length of the vector.