Problem due Wed, Sept. 1

1. Consider the canonical inner product on $\mathbb{C}^n$,

$$\langle (x_1, \ldots, x_n), (y_1, \ldots, y_n) \rangle_0 := \sum_{k=1}^{n} x_k \overline{y}_k$$

Describe necessary and sufficient conditions for an $n \times n$ matrix with complex entries $A \in M_n(\mathbb{C})$ so that the map

$$\langle x, y \rangle := \langle Ax, y \rangle_0$$

defines an inner product on $\mathbb{C}^n$.