Sol^n 3 $x^* A x > 0$

$x^* A x = \langle Ax, x\rangle = \langle x, A^* x\rangle \Rightarrow \overline{\langle A^* x, x\rangle}$
$= \langle A^* x, x\rangle$

$\Downarrow$

$\langle Ax - A^* x, x\rangle = 0$

$\Rightarrow$ $\Downarrow$

$\langle (A - A^*) x, x\rangle = 0$. $\forall x \to n\times 1$ vectors. nonzero. that is $x \in \mathbb{C}^n$.

So to prove $(A = A^*)$.

Let $A - A^* = M$

$\langle Mx, x\rangle = 0 \longrightarrow (1)$

Let $y \in \mathbb{C}^n$ be arbitrary. and $k \to$ constant.

$\Rightarrow \langle M(x + ky), x + ky\rangle = 0$ $\because$ (1). is valid for all x.

$\langle M(x+ky), x+ky\rangle = \bar{k}\langle Mx, y\rangle + k\langle My, x\rangle \longrightarrow (2)$

put $k = 1$ in (2):

$\langle My, x\rangle = 0 \Rightarrow$

$\bar{k}\langle Mx, y\rangle = 0 \Rightarrow \langle Mx, y\rangle = 0 \quad \forall y \in \mathbb{C}^n$.

$\Downarrow$

$Mx = 0 \Rightarrow A - A^* = 0$

$\boxed{A = A^*}$.