# Step-1

Let $A$ be a Hermitian matrix and $c$ be any real scalar.

The objective is to show that $cA$ is also Hermitian.

# Step-2

A matrix $A$ is said to be Hermitian if it is equal to the conjugate transpose, that is $A^H = A$.

Now consider the expression,

$$\begin{aligned}(cA)^H &= \bar{c}A^H \\ &= cA^H && \text{As } c \text{ is real, so } \bar{c} = c. \\ &= cA && \text{As } A \text{ is Hermitian, so } A^H = A.\end{aligned}$$

As $(cA)^H = cA$, for any real scalar *c,* so $cA$ is **Hermitian**.

# Step-3

Suppose $c = i$.

Now show that $(iA)$ is skew-Hermitian.

A matrix $A$ is said to be skew-Hermitian if $A = -A^H$.

Consider the expression,

$$\begin{aligned}(iA)^H &= \bar{i}A^H \\ &= (-i)A^H && \text{Use } \bar{i} = -i. \\ &= -iA && \text{As } A \text{ is Hermitian, so } A^H = A.\end{aligned}$$

As $(iA)^H = -iA$, so $iA$ is a **skew-Hermitian**.