Step-1

(a)

The objective is to find the relation between the determinant of A^H and the determinant of A.

It is known that $\det A^T = \det A$

$\left(\text{Since } A^H = \text{Transpose of conjugate matrix}\right)$

But, $\det A^H = \overline{(\det A)}$

Hence, $\boxed{\det\left(A^H\right) = \overline{(\det A)}}$

Step-2

(b)

The objective is to prove that the determinant of a Hermitian matrix is real.

Let A be any Hermitian matrix

Then $A^H = A$

Take determinant on both sides, to get;

$$\det\left(A^H\right) = \det A$$

$$\left(\text{Since } \det A^H = \overline{(\det A)}\right)$$

$$= \overline{\left(\det A\right)}$$

$$\begin{pmatrix} \text{Since} \\ a+ib = a-ib \\ \text{this implies;} \\ ib = -ib \\ \text{this implies;} \\ b = 0 \end{pmatrix}$$

$= \text{real number}$

Hence, the determinant of a Hermitian matrix is **real**.