

Q-

M is a 3×3 matrix, $|M|=1$ &
 $MM' = I$, prove that $|M-I|=0$

$$|M-I| = |M-MM'| \quad (MM'=I, \text{ given})$$

$$= |M(I-M')|$$

$$= |M| |I-M'|$$

$$\left\{ |AB| = |A| |B| \right\}$$

$$\boxed{|M-I| = |I-M'|}$$

$$\left\{ |M|=1, \text{ given} \right\}$$

→ ①

$$|M-I| = |(M-I)'| \quad (|A| = |A'|)$$

$$= |M'-I|$$

$$= |- (I-M')|$$

$$= (-1)^3 |I-M'|$$

$$\left\{ |kA| = k^n |A| \right\}$$

• $n \rightarrow$ order of matrix

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$$|M-I| = -|I-M'|$$

$$|M-I| = -|M-I|$$

{from ①}

$$2|M-I| = 0$$

$$\boxed{|M-I| = 0} \quad \underline{\text{Proved}}$$