

$$\begin{aligned}
 2\text{(ii)} \quad & \frac{1 - \tan^2 45^\circ}{1 + \tan^2 45^\circ} \\
 &= \frac{1 - 1^2}{1 + 1^2} \\
 &= \frac{1 - 1}{1 + 1} \\
 &= \frac{0}{2} \\
 &= 0 \quad (\text{D})
 \end{aligned}$$

$$\begin{aligned}
 2\text{(iii)} \quad & \sin 2A = 2 \sin A \\
 & \text{True for } A = 0^\circ \quad (\text{A})
 \end{aligned}$$

$$\begin{aligned}
 2\text{(iv)} \quad & \frac{2 \tan 30^\circ}{1 - \tan^2 30^\circ} \\
 &= \frac{2 \times \frac{1}{\sqrt{3}}}{1 - \left(\frac{1}{\sqrt{3}}\right)^2} \\
 &= \frac{\frac{2}{\sqrt{3}}}{1 - \frac{1}{3}} \\
 &= \frac{\frac{2}{\sqrt{3}}}{\frac{2}{3}} \\
 &= \frac{2}{\sqrt{3}} \times \frac{3}{2} \sqrt{3} \\
 &= \tan 60^\circ \quad (\text{C})
 \end{aligned}$$

$$\begin{aligned}
 3 \quad & \tan(A+B) = \sqrt{3} \\
 & \Rightarrow A+B = 60^\circ \quad [\because \tan 60^\circ = \sqrt{3}] \quad \text{--- (1)}
 \end{aligned}$$

$$\begin{aligned}
 & \tan(A-B) = \frac{1}{\sqrt{3}} \\
 & \Rightarrow A-B = 30^\circ \quad [\because \tan 30^\circ = \frac{1}{\sqrt{3}}] \quad \text{--- (2)}
 \end{aligned}$$

$$\begin{aligned}
 & \text{(1) + (2)} \\
 & A+B = 60^\circ \\
 & A-B = 30^\circ \\
 \hline
 & 2A = 90^\circ
 \end{aligned}$$

$$\Rightarrow A = 45^\circ$$

Sub (1)

$$45^\circ + B = 60^\circ$$

$$\Rightarrow B = 15^\circ$$

$$\therefore A = 45^\circ, B = 15^\circ$$

$$4\text{(i)} \quad \sin(A+B) = \sin A + \sin B$$

False

$$\text{let } A = 30^\circ, B = 60^\circ$$

$$\text{LHS} = \sin(30^\circ + 60^\circ)$$

$$= \sin 90^\circ$$

$$= 1$$

$$\text{RHS} = \sin 30^\circ + \sin 60^\circ$$

$$= \frac{1}{2} + \frac{\sqrt{3}}{2}$$

$$= \frac{\sqrt{3}}{2}$$

$$\therefore \text{LHS} \neq \text{RHS}$$