



Question 22:

$$\begin{aligned}
 & \frac{\sec^2 54^\circ - \cot^2 36^\circ}{\operatorname{cosec}^2 57^\circ - \tan^2 33^\circ} + 2 \sin^2 38^\circ \sec^2 52^\circ - \sin^2 45^\circ \\
 &= \frac{\sec^2 54^\circ - \cot^2 (90^\circ - 54^\circ)}{\operatorname{cosec}^2 57^\circ - \tan^2 (90^\circ - 57^\circ)} + 2 \sin^2 38^\circ \sec^2 (90^\circ - 38^\circ) - \sin^2 45^\circ \\
 &= \frac{\sec^2 54^\circ - \tan^2 54^\circ}{\operatorname{cosec}^2 51^\circ - \cot^2 57^\circ} + 2 \sin^2 38^\circ \operatorname{cosec}^2 38^\circ - \sin^2 45^\circ \\
 &= \frac{1}{1} + 2 \times 1 - \left(\frac{1}{\sqrt{2}} \right)^2 = 1 + 2 - \frac{1}{2} = \frac{5}{2}
 \end{aligned}$$

Question 23:

$$\begin{aligned}
 & \frac{\sec^2 (90^\circ - \theta) - \cot^2 \theta}{2 (\sin^2 25^\circ + \sin^2 65^\circ)} + \frac{2 \cos^2 60^\circ \tan^2 28^\circ \tan^2 62^\circ}{3 (\sec^2 43^\circ - \cot^2 47^\circ)} \\
 &= \frac{\sec^2 (90^\circ - \theta) - \cot^2 \theta}{2 [\sin^2 25^\circ + \sin^2 (90^\circ - 25^\circ)]} + \frac{2 \cos^2 60^\circ \tan^2 28^\circ \tan^2 (90^\circ - 28^\circ)}{3 [\sec^2 43^\circ - \cot^2 (90^\circ - 43^\circ)]} \\
 &= \frac{\operatorname{cosec}^2 \theta - \cot^2 \theta}{2 (\sin^2 25^\circ + \cos^2 25^\circ)} + \frac{2 \cos^2 60^\circ \tan^2 28^\circ \cot^2 28^\circ}{3 (\sec^2 43^\circ - \tan^2 43^\circ)} \\
 &= \frac{1}{2 \times 1} + \frac{2 \left(\frac{1}{2} \right)^2 \times \tan^2 28^\circ \times \frac{1}{\tan^2 28^\circ}}{3 \times 1} \\
 &= \frac{1}{2} + \frac{1}{2 \times 3} = \frac{1}{2} + \frac{1}{6} = \frac{3+1}{6} = \frac{4}{6} = \frac{2}{3}
 \end{aligned}$$

***** END *****