

Question 18:

$$\frac{-\tan\theta\cot(90^{\circ}-\theta) + \sec\theta\cos\sec(90^{\circ}-\theta) + \sin^{2}35^{\circ} + \sin^{2}55^{\circ}}{\tan 10^{\circ}\tan 20^{\circ}\tan 30^{\circ}\tan 70^{\circ}\tan 80^{\circ}} = \frac{-\tan^{2}\theta + \sec^{2}\theta + \sin^{2}(90^{\circ}-55^{\circ}) + \sin^{2}55^{\circ}}{\tan 10^{\circ}\tan 20^{\circ}\tan 30^{\circ}\tan(90^{\circ}-20^{\circ})\tan(90^{\circ}-10^{\circ})} = \frac{1+\cos^{2}55^{\circ} + \sin^{2}55^{\circ}}{\tan 10^{\circ}\tan 20^{\circ}\tan 30^{\circ} \times \cot 20^{\circ}\cot 10^{\circ}} = \frac{1+1}{\tan 10^{\circ}\tan 20^{\circ} \times \frac{1}{\sqrt{3}} \times \frac{1}{\tan 20^{\circ}} \times \frac{1}{\tan 10^{\circ}}} = \frac{1+\cos^{2}\theta + \sin^{2}\theta = 1 \text{ and } \tan 30^{\circ} = \frac{1}{\sqrt{3}}}{\sin 10^{\circ}\tan 20^{\circ} \times \frac{1}{1}} = 2\sqrt{3}$$

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

Question 19:

$$\tan 7^{\circ} \tan 23^{\circ} \tan 60^{\circ} \tan 67^{\circ} \tan 83^{\circ} + \frac{\cot 54^{\circ}}{\tan 36^{\circ}} \\ + \sec 20^{\circ} \sec 70^{\circ} - 2$$

$$= \tan 7^{\circ} \tan 23^{\circ} \tan 60^{\circ} \tan (90^{\circ} - 23^{\circ}) \tan (90^{\circ} - 7^{\circ}) \\ + \frac{\cot (90^{\circ} - 36^{\circ})}{\tan 36^{\circ}} + \sin 20^{\circ} \sec (90^{\circ} - 20^{\circ}) - 2$$

$$= \tan 7^{\circ} \tan 23^{\circ} \tan 60^{\circ} \cot 23^{\circ} \cot 7^{\circ} + \frac{\tan 36^{\circ}}{\tan 36^{\circ}} \\ + \sin 20^{\circ} \csc 20^{\circ} - 2$$

$$= \left(\tan 7^{\circ} + \frac{1}{\tan 7^{\circ}}\right) \times \left(\tan 23^{\circ} \times \frac{1}{\tan 23^{\circ}}\right) \times \sqrt{3} + \frac{1}{1} + 1 - 2$$

$$\left[\cot \theta = \frac{1}{\tan \theta}, \tan 60^{\circ} = \sqrt{3}, \sin \theta \csc \theta = 1\right]$$

$$= \sqrt{3}$$

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