

1. If $A + B = 225^\circ$, then find the value of $\frac{\cot A}{1 + \cot A} \times \frac{\cot B}{1 + \cot B}$.
2. If $\tan A - \tan B = x$ and $\cot B - \cot A = y$, then find the value of $\cot (A - B)$.
3. Prove that $\frac{\tan^2 2\theta - \tan^2 \theta}{1 - \tan^2 2\theta \tan^2 \theta} = \tan 3\theta \tan \theta$
4. If $A + B = 45^\circ$, show that $(1 + \tan A)(1 + \tan B) = 2$.
5. If $\tan A = 1/2$, $\tan B = 1/3$, then prove that $\cos 2A = \sin 2B$.
6. Find the maximum value of $1 + \sin \left(\frac{\pi}{4} + \theta\right) + 2\sin \left(\frac{\pi}{4} - \theta\right)$ for all real values of θ .
7. Find the value of $\cos \frac{\pi}{12} \left(\sin \frac{5\pi}{12} + \cos \frac{\pi}{4} \right) + \sin \frac{\pi}{12} \left(\cos \frac{5\pi}{12} - \sin \frac{\pi}{4} \right)$
8. If $\cos (\alpha + \beta) + \sin (\alpha - \beta) = 0$ and $\tan \beta \neq 1$, then find the value of $\tan \alpha$.
9. If $\sin A + \cos 2A = 1/2$ and $\cos A + \sin 2A = 1/3$, then find the value of $\sin 3A$.
10. If $\sin x + \sin y + \sin z = 0 = \cos x + \cos y + \cos z$, then find the value of expression $\cos (\theta - x) + \cos (\theta - y) + \cos (\theta - z)$.

Answer Key

1. $\frac{1}{2}$ 2. $\frac{1}{x} + \frac{1}{y}$ 6. $1 + \sqrt{5}$ 7. $\frac{3}{2}$ 8. -1
9. -59/72 10. 0

