CLASS X Mathematics Assignment
(Trigonometry)

Prove the following Trigonometric Identities

1. $\frac{1}{\cot^2 A} + \frac{1}{1+\tan^2 A} = \frac{1}{1-\sin^2 A} - \frac{1}{\text{cosec}^2 A}$ [CBSE 2025 (30/5/1)]
2. $\frac{\cot\theta + \text{cosec}\theta - 1}{\cot\theta - \text{cosec}\theta + 1} = \frac{1+\cos\theta}{\sin\theta}$ [CBSE 2025 (30/5/2)]
3. If $\tan\theta + \sin\theta = m$ and $\tan\theta - \sin\theta = n$, then prove that $m^2 - n^2 = 4\sqrt{mn}$. [CBSE 2025 30/2/2]
4. $\frac{\cot A - 1}{2 - \sec^2 A} = \frac{\cot A}{1+\tan A}$ [CBSE 2025 30/2/2]
5. $\frac{\cos A - \sin A + 1}{\cos A + \sin A - 1} = \text{cosec}A + \cot A$ [CBSE 2019 4/5/1]
6. $\frac{\sin A - 2\sin^3 A}{2\cos^3 A - \cos A} = \tan A$ [CBSE 2018 30/1]
7. $\left(\frac{1+\tan^2 A}{1+\cot^2 A}\right) = \left(\frac{1-\tan A}{1-\cot A}\right)^2 = \tan^2 A$ [NCERT]
8. $\tan^4\theta + \tan^2\theta = \sec^4\theta - \sec^2\theta$ [CBSE 2020 30/2/1]
9. If $\sin\theta + \cos\theta = \sqrt{3}$, then prove that $\tan\theta + \cot\theta = 1$. [Exemplar, CBSE 2020 30/1/1]
10. $\sqrt{\frac{\sec\theta - 1}{\sec\theta + 1}} + \sqrt{\frac{\sec\theta + 1}{\sec\theta - 1}} = 2\text{cosec}\theta$ [CBSE 2019 30/2/2]
11. $(1 + \cot A - \text{cosec}A)(1 + \tan A + \sec A) = 2$ [CBSE 2019 30/1/2]
12. $\frac{\sin\theta - \cos\theta + 1}{\cos\theta + \sin\theta - 1} = \frac{1}{\sec\theta - \tan\theta}$ [CBSE 2020 (30/4/1)]
13. If $\sec\theta = x + \frac{1}{4x}$, prove that $\sec\theta + \tan\theta = 2x$ or $\frac{1}{2x}$.
14. $\frac{\tan\theta}{1-\tan\theta} - \frac{\cot\theta}{1-\cot\theta} = \frac{\cos\theta + \sin\theta}{\cos\theta - \sin\theta}$ [CBSE 2019 (30/5/1)]
15. $\frac{\tan\theta}{1+\cot\theta} + \frac{\cot\theta}{1+\tan\theta} = \tan\theta + \cot\theta - 1$ [CBSE BASIC 430/3/3]
16. $\frac{\cos\theta - 2\cos^3\theta}{\sin\theta - 2\sin^3\theta} + \cot\theta = 0$. [CBSE 2025 30/6/3]

LONG ANSWER QUESTIONS (5 MARKS)

17. $\frac{\tan^3\theta}{1+\tan^2\theta} + \frac{\cot^3\theta}{1+\cot^2\theta} = \sec\theta\text{cosec}\theta - 2\sin\theta\cos\theta$ [CBSE 2019 (30/3/3), 2025 (30/5/3)]
18. $\frac{\tan\theta}{1-\cot\theta} + \frac{\cot\theta}{1-\tan\theta} = 1 + \sec\theta\text{cosec}\theta$ [CBSE 2024 (30/1/1)]
19. $\frac{\sin A + \cos A}{\sin A - \cos A} + \frac{\sin A - \cos A}{\sin A + \cos A} = \frac{2}{2\sin^2 A - 1}$ [CBSE 2024 (30/1/1)]

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20. (a) If a sec $\theta + b\tan\theta = m$ and $b\sec\theta + a\tan\theta = n$, [CBSE 2025 30/6/1]

prove that $a^2 + n^2 = b^2 + m^2$

(b) Use the identity : $\sin^2 A + \cos^2 A = 1$ to prove that $\tan^2 A + 1 = \sec^2 A$. Hence, find the value of $\tan A$, when $\sec A = \frac{5}{3}$, where A is an acute angle.

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