Precalculus

Angle Formulas & Trigonometric Identities

I. Quotient/Reciprocal/Pythagorean Identities
Simplify the following trigonometric expressions:

1. \( \frac{2 - 2 \sin^2 x}{\cos x} \)
2. \( (\sin x - \cos x)^2 \)
3. \( \frac{\sin^2 B}{\cos B} + \cos B \)

4. \( \frac{\sin x \cdot \cos x}{\tan x} \)
5. \( \frac{1 - \cos^2 x}{\sin^2 x} \)
6. \( \frac{\sin^2 A}{\tan A} \)

7. \( \sin \theta (\cot \theta - \csc \theta) \)
8. \( \frac{\sec \theta}{\tan \theta} \)
9. \( (1 + \cos x)(1 - \cos x) \)

10. Starting with \( \sin^2 \theta + \cos^2 \theta = 1 \), derive the formula for \( \tan^2 \theta + 1 = \sec^2 \theta \).

II. Proving Identities

11. \( \frac{\tan \theta \csc^2 \theta}{1 + \tan^2 \theta} = \cot \theta \)
12. \( \sec \theta - \sin \theta \tan \theta = \cos \theta \)
I. Sum & Difference of Angles

1. The expression $\cos 40^\circ \cos 10^\circ + \sin 40^\circ \sin 10^\circ$ is equivalent to...?

2. If $A$ and $B$ are positive acute angles, $\sin A = \frac{5}{13}$, and $\cos B = \frac{4}{5}$, what is the value of $\sin(A + B)$?

3. If $\sin A = \frac{3}{5}$, $\sin B = \frac{5}{13}$, and angles $A$ and $B$ are acute angles, what is the value of $\cos(A - B)$?

4. If $\tan A = \frac{2}{3}$ and $\tan B = 3$, express $\tan(A - B)$ as a fraction in simplest form.

5. The expression $\tan(180^\circ + x)$ is equivalent to...?

II. Double Angles

6. If $\theta$ is in Quadrant II and $\cos \theta = -\frac{3}{4}$, find an exact value for $\sin 2\theta$.

7. If $\sin A = \frac{2}{3}$, find $\cos 2A$.

8. $\sin A = \frac{\sqrt{5}}{3}$ and $\angle A$ is in Quadrant I. Find, in simplest form, the value of $\sin 2A$, $\cos 2A$, $\tan 2A$.