Proving Identities

Refer to the list of strategies below when answering the following 4 questions.

1. Use formula sheet substitutions.
2. Convert to sine and cosine ratios.
3. Use the conjugate.
4. Use factoring.
5. Combine 2 terms into 1 term.

1. A possible first step to simplifying $\frac{\sin^2 x}{1+\cos x}$ is

   $\frac{\sin^2 x}{1+\cos x}\left(\frac{1-\cos x}{1-\cos x}\right)$.

   Identify the strategy used, and complete the simplification.

2. In order to first simplify the numerator of $\frac{4\cos^2 x-1}{2\cos^2 x+1}$, identify the strategy that would likely be used. Complete the simplification.

3. Consider the expression, $\frac{\cot x}{\cos^3 x+\sin^2 x\cos x}$.

   a) What strategy could be used on the numerator?
   b) Which 2 strategies, in order, could be used on the denominator?
   c) Simplify the expression.

4. Given $\frac{\sec x + \sin x}{1 + \sin x \cos x}$, which strategy can be used on the numerator? Complete the simplification.

5. The expression, $\frac{\tan x - \sec x}{1 - \sin x}$, for all permissible values of x, is equivalent to

a) csc x　　b) –csc x　　c) sec x　　d) –sec x

6. a) Given the identity, $\frac{2\cos^2\theta - 2}{\sin\theta} = -2\sin\theta$, use an algebraic process to show LS = RS.

b) Which non-permissible values for θ should be stated for this identity?

7. Use double-angle identities to prove $\frac{2\tan x}{1 - \tan^2 x} = \frac{\sin(2x)}{\cos^2 x - \sin^2 x}$

8. Is, $\frac{\sin(2x)}{1+\cos(2x)} = \cot x$, an identity? Explain.

9. Prove the identity $\frac{\sin 2x - \cos x}{4\sin^2 x - 1} = \frac{\sin^2 x \cos x + \cos^3 x}{2\sin x + 1}$ for all permissible values of x.