Name: _____

Answer the questions in the spaces provided on the following pages. If you run out of room for an answer, continue on the back of the page. Show **all** your work!

1. Prove the following identity: $\dfrac{\sec^2 x}{\sec^2 x - 1} = \csc^2 x$

2. Prove the following identity: $\csc^2 x \tan^2 x - 1 = \tan^2 x$

3. Prove the following identity: $\tan^2 x \sin^2 x = \tan^2 x - \sin^2 x$

4. Prove the following identity: $\dfrac{\cos x + 1}{\sin^3 x} = \dfrac{\csc x}{1 - \cos x}$

5. **Bonus <u>extra hard</u> question:** Prove the following identity: $\dfrac{1+\tan^2 x}{\sec x} = \sqrt{\dfrac{1}{\frac{1}{2}\left(1-\cos(2x)\right)}}$