Simplify.

$\sin x \cos^2 x - \sin x$

$\sin x(\cos^2 x - 1)$

$\sin x(-\sin^2 x)$

$-\sin^3 x$

$\sin^2 x + \cos^2 x = 1$

$\sin^2 x = 1 - \cos^2 x$

$-\sin^2 x = -1 + \cos^2 x$

$\sin t + \cot t \cdot \cos t$

$\sin t + \frac{\cos t}{\sin t} \cdot \cos t$

$\frac{\sin t}{\sin t} \cdot \sin t + \frac{\cos^2 t}{\sin t}$

$\frac{\sin^2 t + \cos^2 t}{\sin t}$

$\frac{1}{\sin t} \Rightarrow \csc t$

$\cos^2 x(\sec^2 x - 1)$

$\cos^2 x(\tan^2 x)$

$\cancel{\cos^2 x} \cdot \frac{\sin^2 x}{\cancel{\cos^2 x}}$

$\sin^2 x$

Verify/Establish

1. Work w/ one side of =
   (most complicated)
2. factor
   add fraction
3. identities
4. convert to sines/cosines
5. Try something. Don't stare.

$$\frac{\sec^2\theta - 1}{\sec^2\theta} = \sin^2\theta$$

$$\frac{\tan^2\theta}{\sec^2\theta} =$$

$$\frac{\frac{\sin^2\theta}{\cos^2\theta}}{\frac{1}{\cos^2\theta}} =$$

$$\frac{\sin^2\theta}{\cancel{\cos^2\theta}} \cdot \frac{\cancel{\cos^2\theta}}{1} =$$

$$\sin^2\theta =$$

$$\frac{1+\sin\alpha}{1+\sin\alpha} \cdot \frac{1}{(1-\sin\alpha)} + \frac{1}{1+\sin\alpha} \cdot \frac{1-\sin\alpha}{1-\sin\alpha} = 2\sec^2\alpha$$

$$\frac{1+\sin\alpha}{1-\sin^2\alpha} + \frac{1-\sin\alpha}{1-\sin^2\alpha} =$$

$$\frac{2}{1-\sin^2\alpha} =$$

$$\frac{2}{\cos^2\alpha} =$$

$$2\sec^2\alpha =$$

$$(\tan^2 x + 1)(\cos^2 x - 1) = -\tan^2 x$$

$$\sec^2 x\,(-\sin^2 x) =$$

$$\frac{-\sin^2 x}{\cos^2 x} =$$

$$-\tan^2 x =$$

$$\tan x + \cot x = \sec x \csc x$$

$$\frac{\sin x}{\sin x} \cdot \frac{\sin x}{\cos x} + \frac{\cos x}{\sin x} \cdot \frac{\cos x}{\cos x} =$$

$$\frac{\sin^2 x + \cos^2 x}{\sin x \cos x} =$$

$$\frac{1}{\sin x \cos x} =$$

$$\csc x \sec x =$$

$$\sec y + \tan y = \frac{\cos y}{1-\sin y} \cdot \frac{1+\sin y}{1+\sin y}$$

$$= \frac{\cos y(1+\sin y)}{1-\sin^2 y}$$

$$= \frac{\cancel{\cos y}\,(1+\sin y)}{\cos^2 y}$$

$$= \frac{1+\sin y}{\cos y}$$

$$= \frac{1}{\cos y} + \frac{\sin y}{\cos y}$$

$$= \sec y + \tan y$$