

①

$$\tan\left(\frac{\pi}{2} - x\right) \sec x = \csc x$$

$$\cot x \sec x$$

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

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



②

$$\frac{\cos\left(\frac{\pi}{2} - x\right)}{\sin\left(\frac{\pi}{2} - x\right)} = \tan x$$

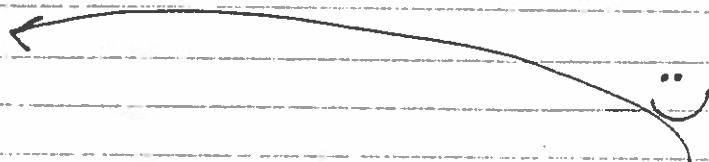
$$\frac{\sin x}{\cos x} = \tan x$$



③

$$\frac{\csc(-x)}{\sec(-x)} = -\cot x$$

$$\frac{-\csc x}{\sec x} = \frac{-\frac{1}{\sin x}}{\frac{1}{\cos x}} = -\frac{1}{\sin x} \cdot \frac{\cos x}{1} = -\frac{\cos x}{\sin x} = -\cot x$$



④

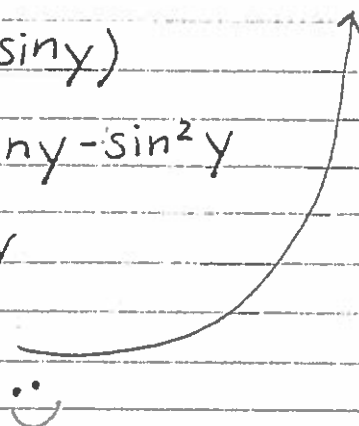
$$(1 + \sin y)(1 + \sin(-y)) = \cos^2 y$$

$$(1 + \sin y)(1 - \sin y)$$

$$1 + \sin y - \sin y - \sin^2 y$$

$$1 - \sin^2 y$$

$$\cos^2 y$$



ⓑ

$$\frac{\cos(-x)}{1 + \sin(-x)} = \sec x + \tan x$$

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

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

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

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

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

$$= \sec x + \tan x \checkmark$$

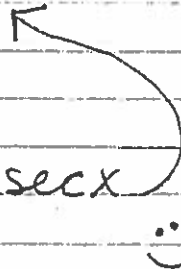
😊

ⓑ

$$\frac{\tan x \cot x}{\cos x} = \sec x$$

$$\frac{\tan x \cdot \frac{1}{\tan x}}{\cos x} = \frac{1}{\cos x} = \sec x$$

😊



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$$\frac{1 + \csc \theta}{\sec \theta} - \cot \theta = \cos \theta$$

$$\frac{1}{\sec \theta} + \frac{\csc \theta}{\sec \theta} - \cot \theta$$

$$\cos \theta + \frac{1/\sin \theta}{1/\cos \theta} - \cot \theta$$

$$\cos \theta + \frac{1}{\sin \theta} \cdot \frac{\cos \theta}{1} - \cot \theta$$

$$\cos \theta + \frac{\cos \theta}{\sin \theta} - \cot \theta$$

$$\cos \theta + \cancel{\cot \theta} - \cancel{\cot \theta} = \cos \theta \quad \text{😊}$$

8

$$\csc^4 x - 2\csc^2 x + 1 = \cot^4 x$$

$$(\csc^2 x - 1)(\csc^2 x - 1)$$

$$(\cot^2 x)(\cot^2 x) = \cot^4 x \quad \text{😊}$$

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

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

FOIL

$$= \frac{1 + \cos x}{\sin x} \quad \checkmark$$

😊

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$$\frac{\cot x}{\csc x - 1} = \frac{\csc x + 1}{\cot x}$$

$$\frac{\cot x}{\csc x - 1} \cdot \frac{\csc x + 1}{\csc x + 1} = \frac{\cot x(\csc x + 1)}{\csc^2 x - 1} = \frac{\cot x(\csc x + 1)}{\cot^2 x}$$
$$= \frac{\csc x + 1}{\cot x} \quad \checkmark$$

😊