31)

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

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

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

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

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

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

51) $\cot^2 x - \cot^2 x \cos^2 x$

$y = \cot^2 x$

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

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

$3 - 3x$

x

$y - y\cos^2 x$

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

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

$\frac{\cos^2 x}{\sin^2 x} (\sin^2 x)$

$\cos^2 x$

53)

$$\frac{\cos^2 x - 4}{\cos x - 2} = \cos x + 2$$

$$\frac{(\cos x + 2)(\cos x - 2)}{\cos x - 2}$$

$$a^2 - b^2 = (a+b)(a-b)$$

69) $\dfrac{\sin^2 x\,(1+\cos x)}{(1-\cos x)(1+\cos x)} =$

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

$$1+\cos x$$

ex1)

$$\frac{\sec^2 x - 1}{\sec^2 x} \stackrel{?}{=} \sin^2 x$$

$$1 + \tan^2 x = \sec^2 x$$

$$\frac{(1 + \tan^2 x) - 1}{\sec^2 x} = \frac{\tan^2 x}{\sec^2 x}$$

$$\frac{\frac{\sin^2 x}{\cos^2 x}}{1/\cos^2 x} \qquad \frac{\sin^2 x}{\cos^2 x} \cdot \cos^2 x$$

ex1)

$$\frac{\sec^2 x - 1}{\sec^2 x} \stackrel{?}{=} \sin^2 x$$

$$\frac{\sec^2 x}{\sec^2 x} - \frac{1}{\sec^2 x}$$

$$1 - \cos^2 x$$

$$\sin^2 x$$

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

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

$$\left(\frac{\sin^2 x}{\cos^2 x}\right)\cos^2 x$$

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

$$1 - 1 - \tan^2 x$$

$$-\tan^2 x$$

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

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

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

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

$-\tan^2 x$

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

$-\cos^2 x \quad -\cos^2 x$

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

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

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