39. $\dfrac{(\sin x + \cos x)^2}{\sin^2 x - \cos^2 x} = \dfrac{\sin^2 x - \cos^2 x}{(\sin x - \cos x)^2}$

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

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

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

87. $(\tan x + \cot x)^4 = \csc^4 x \sec^4 x$

$$\left[(\tan x + \cot x)^2\right]^2$$

$$= \left[\tan^2 x + 1 + 1 + \cot^2 x\right]^2$$

$$= \left[\sec^2 x + \csc^2 x\right]^2$$

$$= \sec^4 x + 2\sec^2 x \csc^2 x + \csc^4 x$$

$$= \frac{1}{\cos^4 x} + \frac{2}{\cos^2 x \sin^2 x} + \frac{1}{\sin^4 x}$$

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

$$= \frac{(\sin^2 x + \cos^2 x)^2}{\sin^4 x \cos^4 x} = \frac{1}{\sin^4 x \cos^4 x} = \csc^4 x \sec^4 x$$

59. $\dfrac{1+\tan^2 u}{1-\tan^2 u} = \dfrac{1}{(\cos^2 u - \sin^2 u)}$

$\dfrac{\frac{1}{\cos^2 u}}{\frac{1}{\cos^2 u}}$

$= \dfrac{\sec^2 u}{1 - \tan^2 u}$

$= \dfrac{1 + \tan^2 u}{1 - \tan^2 u}$

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

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

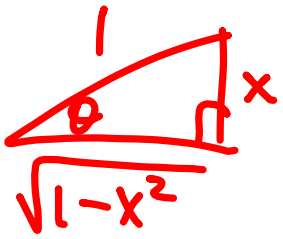
$= \dfrac{\sin x - 1}{\sin x + 1}$

33. $\cot(-\alpha)\cos(-\alpha) + \sin(-\alpha) = -\csc\alpha$

$$-\frac{\cos\alpha}{\sin\alpha}(\cos\alpha) - \frac{\sin^2\alpha}{\sin\alpha}$$

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

89. $\dfrac{x}{\sqrt{1-x^2}}, \quad x = \sin\theta$



tanθ