29. $\cot(-\alpha)\cos(-\alpha) + \sin(-\alpha) = -\dfrac{\cos\alpha}{\sin\alpha}\cos\alpha - \sin\alpha = \dfrac{-\cos^2\alpha - \sin^2\alpha}{\sin\alpha} = \dfrac{-1}{\sin\alpha} = -\csc\alpha$

31. $(1 - \sin x)(1 + \sin x) = 1 - \sin^2 x = \cos^2 x$

33. $(1 - \cos\beta)(1 + \cos\beta) = 1 - \cos^2\beta = \sin^2\beta = \dfrac{1}{\csc^2\beta}$

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

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

37. $\dfrac{\sec t - \cos t}{\sec t} = \dfrac{\dfrac{1}{\cos t} - \cos t}{\dfrac{1}{\cos t}} = \dfrac{\dfrac{1}{\cos t} - \cos t}{\dfrac{1}{\cos t}} \cdot \dfrac{\cos t}{\cos t} = \dfrac{1 - \cos^2 t}{1} = \sin^2 t$

39. $\dfrac{1}{1 - \sin^2 y} = \dfrac{1}{\cos^2 y} = \sec^2 y = 1 + \tan^2 y$

41. $(\cot x - \csc x)(\cos x + 1) = \cot x \cos x + \cot x - \csc x \cos x - \csc x$

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

43. $(1 - \cos^2 x)(1 + \cot^2 x) = \sin^2 x\left(1 + \dfrac{\cos^2 x}{\sin^2 x}\right) = \sin^2 x + \cos^2 x = 1$

45. $2\cos^2 x - 1 = 2(1 - \sin^2 x) - 1 = 2 - 2\sin^2 x - 1 = 1 - 2\sin^2 x$

47. $\dfrac{1 - \cos\alpha}{\sin\alpha} = \dfrac{1 - \cos\alpha}{\sin\alpha} \cdot \dfrac{1 + \cos\alpha}{1 + \cos\alpha} = \dfrac{1 - \cos^2\alpha}{\sin\alpha(1 + \cos\alpha)} = \dfrac{\sin^2\alpha}{\sin\alpha(1 + \cos\alpha)} = \dfrac{\sin\alpha}{1 + \cos\alpha}$

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

51. $\dfrac{(\sin t + \cos t)^2}{\sin t \cos t} = \dfrac{\sin^2 t + 2\sin t \cos t + \cos^2 t}{\sin t \cos t} = \dfrac{\sin^2 t + \cos^2 t}{\sin t \cos t} + \dfrac{2\sin t \cos t}{\sin t \cos t} = \dfrac{1}{\sin t \cos t} + 2$

$= 2 + \sec t \cos t$

53. $\dfrac{1 + \tan^2 u}{1 - \tan^2 u} = \dfrac{1 + \dfrac{\sin^2 u}{\cos^2 u}}{1 - \dfrac{\sin^2 u}{\cos^2 u}} = \dfrac{1 + \dfrac{\sin^2 u}{\cos^2 u}}{1 - \dfrac{\sin^2 u}{\cos^2 u}} \cdot \dfrac{\cos^2 u}{\cos^2 u} = \dfrac{\cos^2 u + \sin^2 u}{\cos^2 u - \sin^2 u} = \dfrac{1}{\cos^2 u - \sin^2 u}$

55. $\dfrac{\sec x}{\sec x - \tan x} = \dfrac{\sec x}{\sec x - \tan x} \cdot \dfrac{\sec x + \tan x}{\sec x + \tan x} = \dfrac{\sec x(\sec x + \tan x)}{\sec^2 x - \tan^2 x} = \dfrac{\sec x(\sec x + \tan x)}{1}$

$= \sec x(\sec x + \tan x)$

57. $\sec v - \tan v = (\sec v - \tan v) \cdot \dfrac{\sec v + \tan v}{\sec v + \tan v} = \dfrac{\sec^2 v - \tan^2 v}{\sec v + \tan v} = \dfrac{1}{\sec v + \tan v}$