

$$13. \cos x \sec x = 1$$

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

$$1$$

$$19. \csc(-x) = -\csc x$$

$$\frac{1}{\sin(-x)}$$

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

$$14. \sin x \csc x = 1$$

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

$$1$$

$$20. \sec(-x) = \sec x$$

$$\frac{1}{\cos(-x)}$$

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

$$\sec x$$

$$15. \tan x \cos x = \sin x$$

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

$$\sin x$$

$$21. \frac{\sin a}{\cos a \tan a} = 1$$

$$16. \cot x \sin x = \cos x$$

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

$$\cos x$$

$$\frac{\sin a \cdot \frac{1}{\tan a}}{\cos a \tan a}$$

$$\frac{\sin a \cdot \frac{1}{\tan a}}{\tan a}$$

$$17. \tan x = \sin x \sec x$$

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

$$\tan x$$

$$22. \frac{\cos a}{\sin a \cot a} = 1$$

$$18. \cot x = \cos x \csc x$$

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

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

$$\cot x$$

$$\frac{\cos a \cdot \frac{1}{\cot a}}{\sin a \cot a}$$

$$\frac{\cos a \cdot \frac{1}{\cot a}}{\cot a}$$

$$= 1$$

$$23. \frac{\cos b \sec b}{\tan b} = \cot b$$

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

$$\frac{1}{\frac{\sin b}{\cos b}} = \cot b$$

$$26. \frac{\csc \theta (\cos \theta + \sin \theta)}{1 - (\cos \theta + \sin \theta)} = \cot \theta + 1$$

$$\frac{\frac{1}{\sin \theta} (\cos \theta + \sin \theta)}{1 - (\cos \theta + \sin \theta)}$$

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

$$24. \frac{\tan b \cot b}{\sin b} = \csc b$$

$$\frac{\frac{\sin b}{\cos b} \cdot \frac{1}{\tan b}}{\sin b}$$

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

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

$$27. \frac{\cos^2 t - \sin^2 t}{\sin t \cos t} = \cot t - \tan t$$

$$\frac{(1 - \sin^2 t) - \sin^2 t}{\sin t \cos t} = \cot t - \tan t$$

$$\frac{1 - 2\sin^2 t}{\sin t \cos t} = \cot t - \tan t$$

$$\frac{1}{\sin t \cos t} - \frac{2\sin^2 t}{\sin t \cos t} = \cot t - \tan t$$

$$\sec t \csc t - 2 \tan t = \cot t - \tan t$$

$$27. \frac{\cos^2 t - \sin^2 t}{\sin t \cos t} = \cot t - \tan t$$

$$25. \frac{(\sec \theta)(\sin \theta + \cos \theta)}{1 - (\sin \theta + \cos \theta)} = \tan \theta + 1$$

$$\frac{\frac{1}{\cos \theta} (\sin \theta + \cos \theta)}{1 - (\sin \theta + \cos \theta)}$$

$$\frac{\frac{\sin \theta}{\cos \theta} + \frac{\cos \theta}{\cos \theta}}{\tan \theta + 1}$$

$$\frac{\cos^2 t - \sin^2 t}{\sin t \cos t} = \cot t - \tan t$$

$$\frac{\cos t}{\sin t} - \frac{\sin t}{\cos t} = \cot t - \tan t$$

$$28. \frac{\cos a - \sin a}{\sin a \cos a} = \csc a - \sec a$$

$$\frac{\cos a}{\sin a \cos a} - \frac{\sin a}{\sin a \cos a}$$

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

$$\csc a - \sec a$$

$$29. \frac{\cos b}{\cot b} + \frac{\sin b}{\tan b} = \sin b + \cos b$$

$$\frac{\cos b}{\frac{\cos b}{\sin b}} + \frac{\sin b}{\frac{\sin b}{\cos b}}$$

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

$$\sin b + \cos b$$

$$30. \frac{\tan u}{\sin u} - \frac{\cot u}{\cos u} = \sec u - \csc u$$

$$\frac{\frac{\sin u}{\cos u}}{\sin u} - \frac{\frac{\cos u}{\sin u}}{\cos u}$$

$$\frac{\sin u}{\cos u} \cdot \frac{1}{\sin u} - \frac{\cos u}{\sin u} \cdot \frac{1}{\cos u}$$

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

$$\sec u - \csc u$$

$$31. \sec^2 \theta - \tan^2 \theta = 1$$

$$32. \csc^2 \theta - \cot^2 \theta = 1$$

$$33. \sin^2 x (1 + \cot^2 x) = 1$$

$$\sin^2 x \left( 1 + \frac{\cos^2 x}{\sin^2 x} \right)$$

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

$$34. \cos^2 x (\tan^2 x + 1) = 1$$

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

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

$$35. (\csc a + 1)(\csc a - 1) = \cot^2 a$$

$$\csc^2 a - 1 = \cot^2 a$$

$$36. (\sec b - 1)(\sec b + 1) = \tan^2 b$$

$$\sec^2 b - 1 = \tan^2 b$$

$$37. \frac{\sin t}{\csc t} + \frac{\cos t}{\sec t} = 1$$

$$\frac{\sin t}{\frac{1}{\sin t}} + \frac{\cos t}{\frac{1}{\cos t}}$$

$$\sin t \cdot \frac{\sin t}{1} + \cos t \cdot \frac{\cos t}{1}$$

$$38. \frac{1}{\sec^2 m} + \frac{1}{\csc^2 m} = 1$$

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

$$39. \frac{\sin^2 x + \cos x}{\cos x} = \sec x$$

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

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

$$\sec x$$

$$40. \frac{\cos^2 x + \sin x}{\sin x} = \csc x$$

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

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

$$\csc x$$

$$41. \frac{1 - (\cos \theta - \sin \theta)^2}{\sin \theta} = \frac{\sin \theta}{2 \cos \theta} \frac{(\cos \theta - \sin \theta)(\cos \theta - \sin \theta)}{\cos^2 \theta - 2 \sin \theta \cos \theta - \sin^2 \theta}$$

$$\frac{1 - (\cos^2 \theta - 2 \sin \theta \cos \theta - \sin^2 \theta)}{\sin \theta}$$

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

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

$$\frac{2 \sin^2 \theta + 2 \sin \theta \cos \theta}{\sin \theta} \rightarrow \frac{\sin \theta (2 \sin \theta + 2 \cos \theta)}{\sin \theta}$$

$$41. \frac{1 - (\cos\theta - \sin\theta)^2}{\sin\theta \cos\theta} = 2\sin\theta$$

$$\begin{aligned} & (\cos\theta - \sin\theta)(\cos\theta - \sin\theta) \\ & \cos^2\theta - \sin\theta\cos\theta - \sin\theta\cos\theta + \sin^2\theta \\ & \cos^2\theta - 2\sin\theta\cos\theta + \sin^2\theta \end{aligned}$$

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

$$\frac{1 - (1 - 2\sin\theta\cos\theta)}{\sin\theta \cos\theta}$$

$$\frac{1 - 1 + 2\sin\theta\cos\theta}{\sin\theta \cos\theta}$$

$$\frac{2\sin\theta\cos\theta}{\sin\theta}$$

$$2 \cdot \frac{2\sin\theta\cancel{\cos\theta}}{\cancel{\cos\theta}}$$

$$= 2\sin\theta$$

$$42. \frac{1 - (\sin\theta - \cos\theta)^2}{\sin\theta} = 2\cos\theta$$

$$\begin{aligned} & (\sin\theta - \cos\theta)(\sin\theta - \cos\theta) \\ & (\sin^2\theta - 2\cos\theta\sin\theta + \cos^2\theta) \end{aligned}$$

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

$$\frac{1 - (1 - 2\sin\theta\cos\theta)}{\sin\theta}$$

$$\frac{1 - 1 + 2\sin\theta\cos\theta}{\sin\theta}$$

$$\frac{2\sin\theta\cos\theta}{\sin\theta}$$

$$2\cos\theta$$

$$43. \frac{\tan w + 1}{\sec w} = \sin w + \cos w$$

$$\frac{\frac{\sin w}{\cos w} + 1}{\frac{1}{\cos w}}$$

$$\begin{aligned} & \cos w \left( \frac{\sin w}{\cos w} + 1 \right) \\ & \sin w + \cos w \end{aligned}$$

$$44. \frac{\cot y + 1}{\csc y} = \cot y + \sin y$$

$$\frac{\frac{\cot y + 1}{\sin y}}{\frac{1}{\sin y}}$$

$$\sin y \cdot \left( \frac{\cot y + 1}{\sin y} \right)$$

$$\cot y + \sin y$$

$$45. \frac{\cos s}{\sin^2 s - 1} = -\sec s$$

$$\frac{\cos s}{\sin^2 s - 1}$$

~~$$\frac{\cos s}{\sin^2 s - 1}$$~~

~~$$\frac{\cos s}{(\sin s - 1)(\sin s + 1)}$$~~

~~$$\frac{\cos s}{\sin^2 s - 1} = -\sec s$$~~

~~$$\frac{\cos s}{\sin^2 s - 1}$$~~

~~$$\frac{\cos s}{\sin^2 s - 1}$$~~

~~$$\frac{\cos s}{\sin^2 s - 1}$$~~

~~$$\frac{\cos s}{\sin^2 s - 1}$$~~

~~$$\frac{\cos s}{\sin^2 s - 1}$$~~

~~$$\frac{\cos s}{\sin^2 s - 1}$$~~

~~$$\frac{\cos s}{\sin^2 s - 1}$$~~

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

$$-(-1 + \sin^2 s)$$

$$-(\sin^2 s - 1) = -\cos^2 s$$

$$46. \frac{\sin t}{\cos^2 t - 1} = -\csc t \quad 1 - \cos^2 t = \sin^2 t$$

$$\frac{\sin t}{\cos^2 t - 1}$$

$$-(-1 + \cos^2 t)$$

$$\frac{\sin t}{\cos^2 t - 1}$$

$$-(\cos^2 t - 1) = -\sin^2 t$$

$$\frac{\sin t}{\cos^2 t - 1}$$

$$\frac{1}{-\sin t}$$

$$= -\csc t$$



$$47. \frac{1}{1-\cos^2\theta} = 1 + \cot^2\theta$$

$$\frac{1}{\sin^2\theta} = \frac{\csc^2\theta}{1 + \cot^2\theta}$$

$$51. \frac{2-\cos^2\theta}{\sin\theta} = \csc\theta + \sin\theta$$

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

$$48. \frac{1}{1-\sin^2\theta} = 1 + \tan^2\theta$$

$$\frac{1}{\cos^2\theta} = \frac{\sec^2\theta}{1 + \tan^2\theta}$$

$$\frac{1}{\sin\theta} + \frac{\sin^2\theta}{\sin\theta} = \csc\theta + \sin\theta$$

$$49. \frac{\sin^2 b}{1-\cos b} = 1 + \cos b$$

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

$$52. \frac{2-\sin^2\theta}{\cos\theta} = \sec\theta + \cos\theta$$

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

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

$$\frac{1}{\cos\theta} + \frac{\cos^2\theta}{\cos\theta} = \sec\theta + \cos\theta$$

$$50. \frac{\cos^2 b}{1+\sin b} = 1 - \sin b$$

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

$$53. \tan x + \cot x = \sec x \csc x$$

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

$$54. \frac{\csc x}{\cot x + \tan x} = \cos x$$

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

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

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

$$\frac{\csc x}{\csc x \sec x} = \cos x$$

$$56. \frac{1 - \cos x}{1 + \cos x} = \frac{\sec x - 1}{\sec x + 1}$$

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

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

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

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

$$\frac{1 - \cos x}{\cos x} \cdot \frac{\cos x}{1 + \cos x}$$

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

$$55. \frac{1 - \csc x}{1 + \csc x} = \frac{\sin x - 1}{\sin x + 1}$$

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

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

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

$$\frac{\sin x - 1}{\cancel{\sin x}} \cdot \frac{\cancel{\sin x}}{\sin x + 1}$$

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

$$57. \csc^2 a - \cos^2 a - \sin^2 a = \cot^2 a$$

$$\frac{1}{\sin^2 a} - \cos^2 a - \sin^2 a$$

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

$$\frac{1}{\sin^2 a} - 1$$

$$\frac{1 - \sin^2 a}{\sin^2 a}$$

$$\frac{\cos^2 a}{\sin^2 a}$$

$$\cot^2 a$$



$$58. \sec^2 a - \sin^2 a - \cos^2 a = \tan^2 a \quad \text{Sol. } (\sin u - \cos u)^2 + (\sin u + \cos u)^2 = 2$$

$$\frac{1}{\cos^2 a} - \sin^2 a - \cos^2 a \quad (\sin u - \cos u)(\sin u - \cos u) + (\sin u + \cos u)(\sin u + \cos u)$$

$$\frac{1}{\cos^2 a} - 1(\sin^2 a + \cos^2 a) \quad \sin^2 - 2\sin u$$

$$\frac{1}{\cos^2 a} - 1$$

$$\frac{1}{\cos^2 a} - \frac{\cos^2 a}{\cos^2 a}$$

$$\frac{1 - \cos^2 a}{\cos^2 a}$$

$$\frac{\sin^2 a}{\cos^2 a}$$

~~$(1 + \cos a)(1 - \cos a)$~~

$$\frac{\sin^2 a}{\cos^2 a}$$

$$\tan^2 a$$

$$59. (\sin x + \cos x)^2 - 1 = 2\sin x \cos x$$

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

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

$$2\sin x \cos x$$

$$60. \sec x - 2\sin x = \frac{(\sin x - \cos x)^2}{\cos x}$$

$$\frac{(\sin x - \cos x)(\sin x - \cos x)}{\cos x}$$

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

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

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

$$\sec x - 2\sin x$$

$$\text{Ex 0. } \sec x - 2\sin x = \frac{(\sin x - \cos x)^2}{\cos x}$$

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

$$\cos x$$

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

$$\cos x$$

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

$$\sec x - 2\sin x$$

$$\text{Ex 4. } \sin^4 x + 2\sin^2 x \cos^2 x + \cos^4 x$$

$$(\sin^2 x + \cos^2 x)(\sin^2 x + \cos^2 x)$$

$$(1)(1) = 1$$

$$\text{Ex 5. } \frac{1 + \cos^2 s}{1 - \cos^4 s} = \csc^2 s$$

$$1 - \cos^4 s$$

$$\frac{1 + \cos^2 s}{(1 + \cos^2 s)(1 - \cos^2 s)}$$

$$\frac{1}{1 - \cos^2 s}$$

$$\frac{1}{\sin^2 s} = \csc^2 s$$

$$\text{Ex 1. } (\sin u - \cos u)^2 + (\sin u + \cos u)^2 = 2$$

$$\sin^2 u - 2\sin u \cos u + \cos^2 u + \sin^2 u + 2\sin u \cos u + \cos^2 u$$

$$\sin^2 u + \cos^2 u + \sin^2 u + \cos^2 u$$

$$1 + 1$$

$$2$$

$$\text{Ex 2. } (\tan x - 1)^2 + (\tan x + 1)^2 = 2\sec^2 x$$

$$(\tan x - 1)(\tan x - 1) + (\tan x + 1)(\tan x + 1)$$

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

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

$$\sec^2 x + \sec^2 x$$

$$2\sec^2 x$$

Ex 6. See # 65

$$\text{Ex 7. } \frac{\cos x}{1 - \sin x} + \frac{\cos x}{1 + \sin x} = 2\sec x$$

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

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

$$1 - \sin^2 x$$

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

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

$$\frac{2}{\cos x}$$

$$2\sec x$$

$$\text{Ex 3. } \sin^4 x - \cos^4 x = 1 - 2\cos^2 x$$

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

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

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

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

$$\frac{2}{\cos x}$$

$$2\sec x$$

$$2\sec x$$

68. see # 67

$$\begin{aligned} 69. \quad \frac{\sin a}{1 - \cos a} - \frac{1 + \cos a}{\sin a} &= 0 \\ \frac{\sin^2 a - (1 + \cos a)(1 - \cos a)}{(1 - \cos a)\sin a} \\ \frac{\sin^2 a - (1 - \cos^2 a)}{(1 - \cos a)\sin a} \\ \frac{\sin^2 a - \sin^2 a}{(1 - \cos a)\sin a} \\ \frac{0}{(\quad)(\quad)} \\ &= 0 \end{aligned}$$

70. see # 69

$$\begin{aligned} 71. \quad \frac{1}{\csc \theta + \cot \theta} + \frac{1}{\csc \theta - \cot \theta} &= 2 \csc \theta \\ \frac{\csc \theta - \cot \theta + \csc \theta + \cot \theta}{(\csc \theta + \cot \theta)(\csc \theta - \cot \theta)} \\ \frac{2 \csc \theta}{\csc^2 \theta - \cot^2 \theta} \\ \frac{2 \csc \theta}{1} \\ &= 2 \csc \theta \end{aligned}$$

72. see # 71

$$\begin{aligned} 73. \quad \frac{\cos^2 n - 3 \cos n + 2}{\sin^2 n} &= \frac{2 - \cos n}{1 + \cos n} \\ \frac{(\cos n - 2)(\cos n - 1)}{1 - \cos^2 n} \\ \frac{(\cos n - 2)(\cos n - 1)}{(1 + \cos n)(1 - \cos n)} \\ \frac{(\cos n - 2) - 1(1 - \cos n)}{(1 + \cos n)(1 - \cos n)} \\ \frac{-1(\cos n - 2)}{1 + \cos n} \\ \frac{2 - \cos n}{1 + \cos n} \end{aligned}$$

74. see # 73

$$\begin{aligned} 75. \quad \frac{1 - \cot^2 x}{\tan^2 x - 1} &= \cot^2 x \\ \frac{\cancel{1} - \cot^2}{\cancel{1} - \frac{\cos^2}{\sin^2}} \\ \frac{\sin^2}{\cos^2} - 1 \\ \frac{\sin^2 - \cos^2}{\sin^2} \\ \frac{\sin^2 - \cos^2}{\cos^2} \\ \frac{\cancel{\sin^2} - \cos^2}{\sin^2} \cdot \frac{\cos^2}{\cancel{\sin^2} - \cos^2} \\ \frac{\cos^2}{\sin^2} \\ \cot^2 x \end{aligned}$$

$$76. \frac{\tan^2 x - 1}{1 - \cot^2 x} = \tan^2 x$$

see # 75

80. see # 79

$$77. \sec^2 x + \csc^2 x = \sec^2 x \csc^2 x$$

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

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

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

$$\sec^2 x \csc^2 x$$

$$81. \frac{1 + \sin t}{\cos t} = \frac{\cos t}{1 - \sin t}$$

$$\frac{1 + \sin t (1 - \sin t)}{\cos t (1 - \sin t)}$$

$$\frac{1 - \sin^2 t}{\cos t (1 - \sin t)}$$

$$\frac{\cos^2 t}{\cos t (1 - \sin t)}$$

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

78. see # 77

82. see # 81

$$79. (\sec x - \tan x)^2 = \frac{1 - \sin x}{1 + \sin x}$$

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

$$\frac{\tan^2 x + 1 - 2 \tan x \sec x + \tan^2 x}{\sec^2 x}$$~~

$$\left( \frac{1 - \sin x}{\cos x} \right)^2$$

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

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

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

$$\frac{(1 - \sin x)(1 - \sin x)}{(1 + \sin x)(1 - \sin x)}$$

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

$$83. \frac{\sin a}{\csc a - 1} = \frac{\sin a + 1}{\cot^2 a}$$

$$\frac{\sin a (\csc a + 1)}{(\csc a - 1)(\csc a + 1)}$$

$$\frac{\sin a (\csc a + 1)}{\csc^2 a - 1}$$

$$\frac{\sin a (\csc a + 1)}{\cot^2 a}$$

$$\frac{\sin a \left( \frac{1}{\sin a} + 1 \right)}{\cot^2 a}$$

$$\frac{1 + \sin a}{\cot^2 a}$$

84. See #83

$$92. \frac{\cos x}{1 - \sin x} - \tan x = \sec x$$

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

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

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

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

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

$$\sec x$$

$$93. \frac{\cot b}{\csc b + 1} = \frac{\csc b - 1}{\cot b}$$

$$\frac{\frac{\cos b}{\sin b}}{\frac{1}{\sin b} + 1}$$

$$\frac{\frac{\cos b}{\sin b}}{\frac{1 + \sin b}{\sin b}}$$

$$\frac{\cos b}{\sin b} \cdot \frac{\sin b}{1 + \sin b}$$

$$\frac{\cos b}{1 + \sin b}$$

$$\frac{\cos b}{1 + \frac{1}{\csc b}}$$

$$\frac{\cos b}{\csc b + 1}$$

$$\cos b \cdot \frac{\csc b}{\csc b + 1}$$

$$\cos b \cdot \frac{1}{\sin b} \cdot \frac{1}{\csc b + 1}$$