1. Verify the Identity:

a. $\dfrac{\cos^2 x - \sin^2 x}{\cos x \sin x} = \cot x - \tan x$

b. $\dfrac{\cos x - \sin x}{\cos x \sin x} = \csc x - \sec x$

c. $\dfrac{\tan x + 1}{\sec x} = \sin x + \cos x$

d. $\dfrac{\sin x + 1}{\cos x} = \dfrac{\cos x}{1 - \sin x}$

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

f. $\dfrac{\sin(x+h) - \sin x}{h} = (\sin x)\left(\dfrac{(\cos h) - 1}{h}\right) + (\cos x)\left(\dfrac{\sin h}{h}\right)$

g. $\dfrac{\cos x - \cos 3x}{\sin x + \sin 3x} = \tan x$

h. $\dfrac{\sin x}{1 - \cos x} = (\csc x)(1 + \cos x)$

i. $\dfrac{\sin 2x}{\cot x} = 1 - \cos 2x$

j. $\dfrac{\sin(x-y)}{\sin(x+y)} = \dfrac{\tan x - \tan y}{\tan x + \tan y}$

k. $\dfrac{2 - \sec^2 x}{\sec^2 x} = \cos 2x$

l. $\dfrac{\sin x + \sin 5x}{\cos x + \cos 5x} = \tan 3x$

m. $\dfrac{\sin x + \sin y}{\cos x - \cos y} = -\cot \dfrac{x-y}{2}$

n. $\dfrac{\cos x - \cos y}{\cos x + \cos y} = -\tan \dfrac{x+y}{2} \tan \dfrac{x-y}{2}$

o. $\sec(x+y) = \dfrac{\sec(x)\sec(y)}{1 - \tan(x)\tan(y)}$

p. $\dfrac{\sin(x+y)}{\cos x \cos y} = \tan x + \tan y$

q. $\dfrac{\cos(x-y)}{\cos x \sin y} = \tan x + \cot y$

r. $\sin(x+y)\sin(x-y) = \cos^2 y - \cos^2 x$

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

t. $1 + \cos(2x) = \cot x \sin(2x)$

u. $\sin(3x) = 3\sin x - 4\sin^3 x$

v. $\sin(2x) = \dfrac{2\tan x}{1+\tan^2 x}$

w. $1 + \tan x \tan(2x) = \tan(2x)\cot(x) - 1$

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

y. $\sin(4x) = 4\sin x \cos x - 8\sin^3 x \cos x$

z. $\cos(4x) = 8\cos^4 x - 8(\cos^2 x) + 1$

aa. $\sin(2x) = \dfrac{2}{\cot x + \tan x}$

bb. $\cos(2x) = \dfrac{1}{1 + \tan(2x)\tan x}$

cc. $\tan(2x) = \dfrac{2\tan x}{1 - \tan^2 x}$

dd. $\sin(2x) = \dfrac{2\tan x}{1 + \tan^2 x}$

ee. $\dfrac{\sin x + \sin y}{\sin x - \sin y} = \dfrac{\tan\left[\frac{1}{2}(x+y)\right]}{\tan\left[\frac{1}{2}(x-y)\right]}$

ff. $\dfrac{1}{\tan x + \tan y} = \dfrac{\cos x \cos y}{\sin(x+y)}$

gg. $(\cot^2 x + 1)(1 - \cos^2 x) = 1$

hh. $(\tan x + \cot x)^2 = \sec^2 x \csc^2 x$