Prove the identity.

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

b) $\tan x + \frac{1}{\tan x} = \frac{1}{\sin x \cos x}$

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

d) $(\sin x + \cos x)^2 = 1 + 2\sin x \cos x$

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

f) $\frac{1+2\sin x \cos x}{\sin x + \cos x} = \sin x + \cos x$

g) $\frac{\sin x}{1-\cos x} - \frac{1+\cos x}{\sin x} = 0$

h) $\sin^2 x - \sin^4 x = \cos^2 x - \cos^4 x$

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

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

k) $\sin^4 x - \cos^4 x = \sin^2 x - \cos^2 x$

l) $\sin^4 x + 2\sin^2 x \cos^2 x + \cos^4 x = 1$

m) $\frac{4}{\cos^2 x} - 5 = 4\tan^2 x - 1$

n) $\frac{\cos x - \sin x - \cos^3 x}{\cos x} = \sin^2 x - \tan x$

o) $\frac{\sin^2 x - 6\sin x + 9}{\sin^2 x - 9} = \frac{\sin x - 3}{\sin x + 3}$

p) $\frac{\tan x \sin x}{\tan x + \sin x} = \frac{\tan x - \sin x}{\tan x \sin x}$