Question #27434

2sinx/sin3x + tanx/tan3x =1

we all know that

$$\sin 3x = 3\sin x - 4\sin^3 x \quad [1]$$
$$\cos 3x = 4\cos^3 x - 3\cos x \quad [2]$$
$$\tan x = \sin x/\cos x \quad [3]$$
$$\sin^2 x + \cos^2 x = 1 \quad [4]$$

substituting this into the problem statement

$$\frac{2sinx}{3sinx-4sin^3x}+\frac{\frac{sinx}{cosx}}{\frac{3sinx-4sin^3x}{4cos^3x-3cosx}}=\frac{2sinx}{3sinx-4sin^3x}+\frac{sinx(4cos^3x-3cosx)}{cosx(3sinx-4sin^3x)}=$$
$$=\frac{2sinx*cosx+4sinx*cos^3x-3cosx*sinx}{(3sinx-4sin^3x)*cosx}=$$
$$=\frac{cosx(2sinx+4sinx*cos^2x-3sinx)}{(3sinx-4sin^3x)*cosx}=\frac{sinx(4cos^2x-1)}{sinx(3-4sin^2x)}$$

Using formula [4]
$4\cos^2 x = 4 - 4\sin^2 x$

And substituting the result we get
$$\frac{4-4sin^2x-1}{3-4sin^2x}=\frac{3-4sin^2x}{3-4sin^2x}=1$$