Continuing in the packet from 04-19…

7. Verify the identity: $(\sin x + \cos x)^2 = 1 + \sin 2x$

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

$1 + 2\sin x\cos x$

$1 + \sin 2x \quad = \quad 1 + \sin 2x$

7.1 Exercises

25–88 ■ Verify the identity.

25. $\dfrac{\sin\theta}{\tan\theta} = \cos\theta$

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

$\dfrac{\sin\theta\cos\theta}{\sin\theta}$

$\cos\theta = \cos\theta$

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

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

$\dfrac{\sin x + \cos x}{\sin x - \cos x} = \dfrac{\sin x + \cos x}{\sin x - \cos x}$

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

$\dfrac{\sec^2 u}{1 - \tan^2 u}$

$\dfrac{\frac{1}{\cos^2 u}}{1 - \frac{\sin^2 u}{\cos^2 u}}$ or

$\dfrac{\cos^2 u}{\cos^2 u}$ $\dfrac{\frac{1}{\cancel{\cos^2 u}}}{\ }$

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

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

$\dfrac{\frac{1}{\cancel{\cos^2 u}} \cos^2 u}{\cos^2 u \left(1 - \frac{\sin^2 u}{\cancel{\cos^2 u}}\right) \cos^2 u}$

$\dfrac{1}{\cos^2 u - \sin^2 u}$

62. $\dfrac{\sec x + \csc x}{\tan x + \cot x} = \sin x + \cos x$

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

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

$\dfrac{\sin x + \cos x}{1}$

$\sin x + \cos x = \sin x + \cos x$

75. $\dfrac{\cos^2 t + \tan^2 t - 1}{\sin^2 t} = \tan^2 t$

$\dfrac{\cancel{1} - \sin^2 t + \tan^2 t \cancel{- 1}}{\sin^2 t}$

$\dfrac{-\sin^2 t + \tan^2 t}{\sin^2 t}$

$\dfrac{-\sin^2 t}{\sin^2 t} + \dfrac{\tan^2 t}{\sin^2 t}$

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

$-1 + \dfrac{\cancel{\sin^2 t}}{\cancel{\sin^2 t} \cos^2 t}$

$-1 + \dfrac{1}{\cos^2 t}$

$-1 + \sec^2 t$

$\sec^2 t - 1$

$\tan^2 t = \tan^2 t$

78. $\dfrac{(1+\sin x)}{(1+\sin x)}\left(\dfrac{1 + \sin x}{1 - \sin x}\right) - \left(\dfrac{1 - \sin x}{1 + \sin x}\right)\dfrac{(1-\sin x)}{(1-\sin x)} = 4 \tan x \sec x$

$\dfrac{\cancel{1} + 2\sin x + \cancel{\sin^2 x} - (\cancel{1} - 2\sin x + \cancel{\sin^2 x})}{(1-\sin x)(1+\sin x)}$

$1 - \sin^2 x$

$\dfrac{4 \sin x}{\cos^2 x}$

$4 \cdot \dfrac{\sin x}{\cos x} \cdot \dfrac{1}{\cos x}$

$4 \tan x \sec x = 4 \tan x \sec x$

83. $\dfrac{\sin^3 x + \cos^3 x}{\sin x + \cos x} = 1 - \sin x \cos x$

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

$1 - \sin x \cos x = 1 - \sin x \cos x$