MTH13 HW

p. 531 - 532 / 16, 24, 30, 38.

N 16 multiply and simplify $\tan^2 u \sec^2 u - \tan^4 u$

Solution: $\tan^2 u \sec^2 u - \tan^4 u = \tan^2 u (\sec^2 u - \tan^2 u) =$

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

by identities (2), (4)

$= \tan^2 u \left(\frac{\cos^2 u}{\cos^2 u} \right) = \boxed{\tan^2 u}$

by identity (6)

N 24 prove $\sec\theta (1-\sin^2\theta) = \cos\theta$

Proof: $\sec\theta (1-\sin^2\theta) = \frac{1}{\cos\theta} \cdot \cos^2\theta = \frac{\cos^2\theta}{\cos\theta} = \cos\theta$

by identities (2), (6)

N 30 prove $\sin y + \sin y \cot^2 y = \csc y$

Proof: $\sin y + \sin y \cot^2 y = \sin y + \cancel{\sin y} \cdot \frac{\cos^2 y}{\sin^{\cancel{2}} y} = \sin y + \frac{\cos^2 y}{\sin y} =$ (5)

$= \frac{\sin^2 y}{\sin y} + \frac{\cos^2 y}{\sin y} = \frac{\sin^2 y + \cos^2 y}{\sin y} = \frac{1}{\sin y} = \csc y$ (6)

N 38 prove $\frac{\sin^2\theta + 2\cos\theta - 1}{\sin^2\theta + 3\cos\theta - 3} = \frac{1}{1-\boxed{\sec\theta}}$

Proof: we'll work with both sides in parallel.

identities: (6), (2)

$\frac{\cancel{\sin^2\theta} + 2\cos\theta - (\cancel{\sin^2\theta} + \cos^2\theta)}{1-\cos^2\theta + 3\cos\theta - 3} \stackrel{?}{=} \frac{1}{1-\boxed{\frac{1}{\cos\theta}}}$

$\frac{2\cos\theta - \cos^2\theta}{-\cos^2\theta + 3\cos\theta - 2} \stackrel{?}{=} \frac{1}{\frac{\cos\theta - 1}{\cos\theta}}$