Math Analysis Worksheet
4.1 Identities

Prove the following identities.

1. $\dfrac{\tan^2\theta}{\sin^2\theta} = \sec^2\theta$

$$\frac{\left(\frac{\sin^2\theta}{\cos^2\theta}\right)}{\sin^2\theta} = \frac{1}{\cos^2\theta}$$

$$\frac{\sin^2\theta}{\cos^2\theta} \cdot \frac{1}{\sin^2\theta} = \frac{1}{\cos^2\theta}$$

$$\frac{1}{\cos^2\theta} = \frac{1}{\cos^2\theta}$$

2. $\sec^2\theta - \tan^2\theta = \sin^2\theta + \cos^2\theta$

$\sec^2\theta - \tan^2\theta = 1$

$\sec^2\theta = 1 + \tan^2\theta$

Alternate

$$\frac{1}{\cos^2\theta} - \frac{\sin^2\theta}{\cos^2\theta} = \sin^2\theta + \cos^2\theta$$

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

$$\frac{(\cos^2\theta)}{\cos^2\theta} = \sin^2\theta + \cos^2\theta$$

$1 = 1$ ✓

$\sin^2\theta + \cos^2\theta = 1$

$\cos^2\theta = 1 - \sin^2\theta$

3. $\csc^2 A - \cot^2 A = \cos A \sec A$

$$1 = \cos A \frac{1}{\cos A}$$

$1 = 1$

4. $\cos x(\sec x - \cos x) = \sin^2 x$

$\cos x \sec x - \cos^2 x = \sin^2 x$

$1 - \cos^2 x = \sin^2 x$

$\sin^2 x = \sin^2 x$