Trigonometric Identities

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

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

$$\cot\theta = \frac{\cos\theta}{\sin\theta} \qquad 1 + \cot^2\theta = \csc^2\theta$$

$$\csc\theta = \frac{1}{\sin\theta} \qquad \sin\theta = \frac{1}{\csc\theta}$$

$$\sec\theta = \frac{1}{\cos\theta} \qquad \cos\theta = \frac{1}{\sec\theta}$$

$$\cot\theta = \frac{1}{\tan\theta} \qquad \tan\theta = \frac{1}{\cot\theta}$$

The sum identities are

$$\sin(A + B) = \sin A \cos B + \cos A \sin B$$
$$\cos(A + B) = \cos A \cos B - \sin A \sin B$$
$$\tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

The three angle difference identities are

$$\sin(A - B) = \sin A \cos B - \cos A \sin B$$
$$\cos(A - B) = \cos A \cos B + \sin A \sin B$$
$$\tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

The double-angle identities are

$$\sin 2A = 2 \sin A \cos A$$
$$\cos 2A = \cos^2 A - \sin^2 A$$
$$\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$$

Prove the following identity:

$$\frac{\sin^2 2\theta}{\cos\theta} \bullet \csc^2\theta = \frac{4}{\sec\theta}$$

$$\frac{(2\sin\theta\cos\theta)^2}{\cos\theta} \bullet \frac{1}{\sin^2\theta}$$

$$\frac{4\sin^2\theta\cos^2\theta}{\sin^2\theta\cos\theta}$$

$4\cos\theta$

$$\frac{4}{\frac{1}{\cos\theta}}$$

$4\cos\theta$

Prove the following identity:

$$\tan\theta + \tan^3\theta = \frac{1}{\cot\theta\cos^2\theta}$$

$\tan\theta(1+\tan^2\theta)$

$\frac{1}{\cot\theta}(\sec^2\theta)$

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

$\frac{1}{\cot\theta}\cdot\frac{1}{\cos^2\theta}$

Finish Review for Homework