Questions from Homework

Reciprocal Identities

$$\csc x = \frac{1}{\sin x} \qquad \sec x = \frac{1}{\cos x} \qquad \cot x = \frac{1}{\tan x}$$

Quotient Identities

$$\tan x = \frac{\sin x}{\cos x} \qquad \cot x = \frac{\cos x}{\sin x}$$

The three forms of the Pythagorean identity are

$$\cos^2 \theta + \sin^2 \theta = 1 \qquad \cot^2 \theta + 1 = \csc^2 \theta \qquad 1 + \tan^2 \theta = \sec^2 \theta$$

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

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

Trig Identities

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

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

$$1 + \cot^2\theta = \csc^2\theta$$

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

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

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

$$\sin(x+y) = \sin x\cos y + \cos x\sin y$$

$$\sin(x-y) = \sin x\cos y - \cos x\sin y$$

$$\cos(x+y) = \cos x\cos y - \sin x\sin y$$

$$\cos(x-y) = \cos x\cos y + \sin x\sin y$$

$$\sin 2\theta = 2\sin\theta\cos\theta$$

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

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

$$\frac{1(1-\sin\theta)}{(1+\sin\theta)(1-\sin\theta)}+\frac{1(1+\sin\theta)}{(1+\sin\theta)(1-\sin\theta)}$$

$$\frac{1-\sin\theta+1+\sin\theta}{(1+\sin\theta)(1-\sin\theta)}$$

$$\frac{2}{1-\sin^2\theta}$$ ← pyth.

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

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

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

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

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

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

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

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

$\tan^3\theta\sec^2\theta - \tan^3\theta = \tan^5\theta$

$\tan^3\theta(\tan^2\theta+1) - \tan^3\theta \mid \tan^5\theta$

$\tan^5\theta + \tan^3\theta - \tan^3\theta$

$\tan^5\theta$

$\tan^3\theta\sec^2\theta - \tan^3\theta = \tan^5\theta$

$\tan^3\theta(\sec^2\theta - 1) \mid$

$\tan^3\theta(\tan^2\theta)$

$\tan^5\theta$

. .

Diff of squares

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

common factor

$$\frac{(\cos x - \sin x)(\cos x + \sin x)}{\cos x(\cos x + \sin x)}$$

$$\frac{\cos x - \sin x}{\cos x}$$