

Unit 4A Test Review WS #2

Verify the following identities

1)
$$\frac{1}{\tan \beta} + \tan \beta = \frac{\sec^2 \beta}{\tan \beta}$$

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

3)
$$\frac{\cos 2x}{1 - \tan^2 x} = \cos^2 x$$

4)
$$\sec y + \tan y = \frac{\cos y}{1 - \sin y}$$

5)

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

6)

$$\sin 2x \cot x = 2 - 2 \sin^2 x$$

7)

$$\tan x = \csc 2x - \cot 2x$$

8)

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

9)

$$\cos x + \sin x \tan x = \sec x$$

10)

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

Trigonometric Identities

Reciprocal Identities:

$$\sin \theta = \frac{1}{\csc \theta} \quad \cos \theta = \frac{1}{\sec \theta} \quad \tan \theta = \frac{1}{\cot \theta}$$

$$\csc \theta = \frac{1}{\sin \theta} \quad \sec \theta = \frac{1}{\cos \theta} \quad \cot \theta = \frac{1}{\tan \theta}$$

Quotient Identities:

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta}$$

Pythagorean Identities:

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

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

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

Cofunction Identities:

$$\sin\left(\frac{\pi}{2} - \theta\right) = \cos \theta$$

$$\csc\left(\frac{\pi}{2} - \theta\right) = \sec \theta$$

$$\tan\left(\frac{\pi}{2} - \theta\right) = \cot \theta$$

$$\cos\left(\frac{\pi}{2} - \theta\right) = \sin \theta$$

$$\sec\left(\frac{\pi}{2} - \theta\right) = \csc \theta$$

$$\cot\left(\frac{\pi}{2} - \theta\right) = \tan \theta$$

Even/Odd Identities:

$$\sin(-\theta) = -\sin \theta$$

$$\cos(-\theta) = \cos \theta$$

$$\tan(-\theta) = -\tan \theta$$

$$\csc(-\theta) = -\csc \theta$$

$$\sec(-\theta) = \sec \theta$$

$$\cot(-\theta) = -\cot \theta$$

Sum & Difference Identities:

$$\sin(\alpha \pm \beta) = \sin \alpha \cos \beta \pm \cos \alpha \sin \beta$$

$$\tan(\alpha \pm \beta) = \frac{\tan \alpha \pm \tan \beta}{1 \mp \tan \alpha \tan \beta}$$

$$\cos(\alpha \pm \beta) = \cos \alpha \cos \beta \mp \sin \alpha \sin \beta$$

Double-Angle Identities:

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

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

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

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

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