

Name: Key

Basic Identities Worksheet

Simplify the following trig expressions as much as possible using the identities.

$$1.) \frac{\cot A}{\tan A} = \frac{\frac{\cos A}{\sin A}}{\frac{\sin A}{\cos A}} = \frac{\cos A \cdot \cos A}{\sin A \cdot \sin A} = \frac{\cos^2 A}{\sin^2 A} = \cot^2 A$$

$$2.) \sin^2 \theta \cos^2 \theta - \cos^2 \theta \quad \text{GCF}$$

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

$$= \cos^2 \theta (-\cos^2 \theta)$$

$$= -\cos^4 \theta$$

$$3.) \cos x + \sin x \tan x$$

$$= \cos x + \sin x \left(\frac{\sin x}{\cos x} \right)$$

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

$$4.) \frac{\sin^2 \theta \cot \theta}{\cos \theta}$$

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

$$= \frac{\sin \theta \cdot \cancel{\cos \theta}}{\cancel{\cos \theta}} = \sin \theta$$

$$5.) \frac{\cos \theta}{\sec \theta - \tan \theta}$$

$$= \frac{\cos \theta}{\frac{1}{\cos \theta} - \frac{\sin \theta}{\cos \theta}}$$

$$= \frac{\cos \theta}{\frac{1 - \sin \theta}{\cos \theta}} = \cos \theta \cdot \frac{\cos \theta}{1 - \sin \theta}$$

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

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

$$6.) \tan A \cdot \cos^2 A$$

$$= \frac{\sin A}{\cos A} \cdot \cos^2 A = \sin A \cos A$$

$$7.) \frac{\tan \beta}{\cot \beta}$$

$$= \frac{\tan \beta}{\frac{1}{\tan \beta}} = \tan \beta \cdot \tan \beta = \tan^2 \beta$$

$$8.) \sin \theta \cot \theta$$

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

$$9.) \cos x \cdot \tan x \cdot \csc x$$

$$= \cancel{\cos x} \cdot \frac{\sin x}{\cancel{\cos x}} \cdot \frac{1}{\sin x} = 1$$

$$10.) \frac{\csc \theta}{1 + \cot^2 \theta}$$

$$= \frac{\csc \theta}{\csc^2 \theta}$$

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

$$11.) \cos^4 \theta + 2 \cos^2 \theta \sin^2 \theta + \sin^4 \theta$$

$$= (\cos^2 \theta + \sin^2 \theta)(\cos^2 \theta + \sin^2 \theta)$$

$$= 1(1)$$

$$= 1$$

$$12.) \sin x + \cos x \tan x$$

$$= \sin x + \cos x \frac{\sin x}{\cos x}$$

$$= \sin x + \sin x$$

$$= 2 \sin x$$

$$13.) (1 - \sin x)(1 + \sin x)$$

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

$$= \cos^2 x$$

$$14.) \sin x - \sin x \cos^2 x$$

$$\sin x (1 - \cos^2 x)$$

$$\sin x (\sin^2 x)$$

$$= \sin^3 x$$

$$15.) \cos x + \tan x \sin x$$

$$= \cos x + \frac{\sin x}{\cos x} \cdot \sin x$$

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

$$16.) \sin^3 x + \sin x \cos^2 x$$

$$= \sin x (\sin^2 x + \cos^2 x)$$

$$= \sin x (1)$$

$$= \sin x$$

$$17.) \frac{\csc \theta - \sin \theta}{\csc \theta}$$

$$= \frac{\csc \theta}{\csc \theta} - \frac{\sin \theta}{\csc \theta}$$

$$= 1 - \frac{\sin \theta}{\frac{1}{\sin \theta}}$$

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

$$18.) \frac{\sin \theta}{\cos \theta} + \frac{\cos \theta}{1 + \sin \theta}$$

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

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

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

$$20.) \frac{\csc x - \sin x}{\csc x}$$

$$19.) \sin^3 \theta + \sin \theta \cos^2 \theta$$

same as 16

$$= \sin \theta (\sin^2 \theta + \cos^2 \theta)$$

$$= \sin \theta$$

same as 17

$$= \frac{\csc x}{\csc x} - \frac{\sin x}{\csc x}$$

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

$$= \cos^2 x$$