Honors Precalculus - Unit 3

Name key

Using Identities Practice Quiz

Date_____ Period____

Use identities to find the value of each expression.

1) Find sin θ and tan θ if $\cos\theta = -\frac{4}{5}$ and $\tan\theta < 0$.

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

$\sin^2\theta + \left(-\frac{4}{5}\right)^2 = 1$

$\sin^2\theta + \frac{16}{25} = 1$

$\sin^2\theta = \frac{9}{25}$

$\sin\theta = \frac{3}{5}$

$\tan\theta = \frac{\frac{3}{5}}{-\frac{4}{5}} = \frac{3}{5}\cdot\frac{-5}{4} = \boxed{-\frac{3}{4}}$

2) Find csc θ and sin θ if $\cos\theta = -\frac{4}{7}$ and $\sin\theta < 0$.

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

$\sin^2\theta + \left(-\frac{4}{7}\right)^2 = 1$

$\sin^2\theta + \frac{16}{49} = 1$

$\sin^2\theta = \frac{33}{49}$

$\sin\theta = -\frac{\sqrt{33}}{7}$

$\csc\theta = -\frac{7}{\sqrt{33}} = \boxed{-\frac{7\sqrt{33}}{33}}$

3) Find cos θ and sin θ if $\cot\theta = -\frac{3}{4}$ and $\cos\theta > 0$.

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

$1 + \left(-\frac{3}{4}\right)^2 = \csc^2\theta$

$1 + \frac{9}{16} = \csc^2\theta$

$\frac{25}{16} = \csc^2\theta$

$-\frac{5}{4} = \csc\theta$

$-\frac{4}{5} = \sin\theta$

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

$-\frac{3}{4} = \frac{\cos\theta}{-4/5}$

$\cos\theta = -\frac{4}{5}\cdot\frac{-3}{4} = \boxed{\frac{3}{5}}$

4) Find csc θ and sin θ if $\cos\theta = -\frac{4}{5}$ and $\csc\theta > 0$.

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

$\sin^2\theta + \left(-\frac{4}{5}\right)^2 = 1$

$\sin^2\theta + \frac{16}{25} = 1$

$\sin^2\theta = \frac{9}{25}$

$\sin\theta = 3/5$

$\csc\theta = \frac{5}{3}$

Simplify.

5) $\sin\theta\sec\theta\cot\theta$

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

$= \boxed{1}$

6) $1 + \tan^2\left(\frac{\pi}{2} - \theta\right)$

$= 1 + \cot^2\theta$

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

7) $\frac{\sec^2(-x) - 1}{\sin^2 x}$

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

$= \frac{\tan^2 x}{\sin^2 x}$

$= \tan^2 x \cdot \frac{1}{\sin^2 x}$

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

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

$= \boxed{\sec^2 x}$

8) $\tan^2 x - \tan^2 x \sin^2 x$

$= \tan^2 x (1 - \sin^2 x)$

$= \tan^2 x (\cos^2 x)$

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

$= \boxed{\sin^2 x}$

Verify the Identity.

9) $\dfrac{\sin x\cos(-x)}{1-\cos^2 x} = \cot x$ GIVEN

$\dfrac{\sin x\cos x}{1-\cos^2 x} = \cot x$ EVEN/ODD IDENTITY

$\dfrac{\sin x\cos x}{\sin^2 x} = \cot x$ PYTHAGOREAN IDENTITY

$\dfrac{\cos x}{\sin x} = \cot x$ DIVISION

$\cot x = \cot x$ ■ QUOTIENT IDENTITY

10) $\dfrac{1-\sin^2 x}{1+\cot^2 x} = \sin^2 x\cos^2 x$ GIVEN

$\dfrac{\cos^2 x}{1+\cot^2 x} = \sin^2 x\cos^2 x$ PYTHAGOREAN IDENTITY

$\dfrac{\cos^2 x}{\csc^2 x} = \sin^2 x\cos^2 x$ PYTHAGOREAN IDENTITY

$\cos^2 x \cdot \dfrac{1}{\csc^2 x} = \sin^2 x\cos^2 x$ DIVISION

$\cos^2 x - \sin^2 x = \sin^2 x\cos^2 x$ ■ RECIPROCAL IDENTITY.

11) $\dfrac{\tan^2 x}{1+\tan^2 x} = \sin^2 x$ GIVEN

$\dfrac{\tan^2 x}{\sec^2 x} = \sin^2 x$ PYTHAGOREAN IDENTITY

$\tan^2 x \cdot \dfrac{1}{\sec^2 x} = \sin^2 x$ DIVISION

$\dfrac{\sin^2 x}{\cos^2 x} \cdot \dfrac{1}{\sec^2 x} = \sin^2 x$ QUOTIENT IDENTITY

$\dfrac{\sin^2 x}{\cos^2 x} \cdot \dfrac{\cos^2 x}{1} = \sin^2 x$ RECIPROCAL IDENTITY

$\sin^2 x = \sin^2 x$ ■ DIVISION

12) $\dfrac{\sec x - 1}{\csc\left(\dfrac{\pi}{2} - \theta\right) + 1} = \dfrac{1-\cos x}{1+\cos x}$ GIVEN

$\dfrac{\sec x - 1}{\sec x + 1} = \dfrac{1-\cos x}{1+\cos x}$ COFUNCTION IDENTITY

$\dfrac{\frac{1}{\cos x} - 1}{\frac{1}{\cos x} + 1} = \dfrac{1-\cos x}{1+\cos x}$ RECIPROCAL IDENTITY

$\dfrac{\frac{1}{\cos x} - \frac{\cos x}{\cos x}}{\frac{1}{\cos x} + \frac{\cos x}{\cos x}} = \dfrac{1-\cos x}{1+\cos x}$ REWRITE "1"

$\dfrac{\frac{1-\cos x}{\cos x}}{\frac{1+\cos x}{\cos x}} = \dfrac{1-\cos x}{1+\cos x}$ SUBTRACTION

$\dfrac{1-\cos x}{\cos x} \cdot \dfrac{\cos x}{1+\cos x} = \dfrac{1-\cos x}{1+\cos x}$ DIVISION

$\dfrac{1-\cos x}{1+\cos x} = \dfrac{1-\cos x}{1+\cos x}$ ■ DIVISION