

Bellwork Tuesday, April 29, 2014

For 1 and 2, simplify each trigonometric expression to a single trig function or number.

1. $\frac{\tan x}{\sec x - \cos x}$

Two methods lead to the same answer

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

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

2. $\frac{1 + \tan \theta}{\tan \theta} - \cot \theta$

Two methods lead to the same answer

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

Find the exact value of each using the Unit Circle.

3. $\sec \frac{15\pi}{4}$

$$\frac{15\pi}{4} - 2\pi = \frac{15\pi}{4} - \frac{8\pi}{4} = \frac{7\pi}{4}$$

$$\sec \left(\frac{7\pi}{4} \right) = \frac{1}{\cos \left(\frac{7\pi}{4} \right)} = \frac{1}{\frac{\sqrt{2}}{2}} = \frac{2}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{2\sqrt{2}}{2} = \sqrt{2}$$

4. $\cot(-840^\circ)$

$$\cot(240^\circ) = \frac{x}{y} = \frac{-\frac{1}{2}}{-\frac{\sqrt{3}}{2}} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

Find the value of each to the nearest hundredth.

5. $\sec 137^\circ$

$$\frac{1}{\cos(137^\circ)} = -1.37$$

6. $\csc\left(-\frac{5\pi}{11}\right)$

$$\frac{1}{\sin\left(-\frac{5\pi}{11}\right)} = -1.01$$