Ch. 5 Worksheet KEY

Thursday, February 19, 2015 6:40 PM

Precalculus
Ch. 5 (More) Practice

Name: Key
Period:

1. Prove: $\cot x(\tan x \sin x + \cos x) = \csc x$ ✓

$\cot x \tan x \sin x + \cot x \cos x$

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

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

2. Prove: $\csc x - \sin x = \cot x \cos x$ ✓

$\frac{1}{\sin x} - \sin x \frac{\sin x}{\sin x}$

$\frac{1 - \sin^2 x}{\sin x} = \frac{\cos^2 x}{\sin x} = \frac{\cos x}{\sin x} \cos x = \cot x \cos x$ ✓

3. Prove: $\cos 3x + \cos x = 2 \cos 2x \cos x$ ✓

$\cos(2x+x) + \cos(2x-x)$

$\cos 2x \cos x - \sin 2x \sin x + \cos 2x \cos x + \sin 2x \sin x$

$2 \cos 2x \cos x$ ✓

4. Prove: $\dfrac{2}{1+\cos 2x} = \sec^2 x$ ✓

$$\frac{2}{1+(2\cos^2 x - 1)} = \frac{2}{2\cos^2 x} = \frac{1}{\cos^2 x} = \sec^2 x \checkmark$$

5. Solve for x over $[0, 2\pi)$: $2\tan x \cos x = \tan x$

$2\tan x\cos x - \tan x = 0$

$\tan x(2\cos x - 1) = 0$

$\tan x = 0$: $\frac{\sin x}{\cos x} = \frac{0}{\#}$; $x = 0, \pi$

$\cos x = 1/2$; $x = \frac{\pi}{3}, \frac{5\pi}{3}$

6. Solve for x over $[0, 2\pi)$: $\cos 2x = \cos x$

$\cos 2x - \cos x = 0$

$2\cos^2 x - 1 - \cos x = 0$

$2\cos^2 x - \cos x - 1 = 0$

$(2\cos x + 1)(\cos x - 1) = 0$

$\cos x = -1/2$; $x = \frac{2\pi}{3}, \frac{4\pi}{3}$

$\cos x = 1$; $x = 0$

$x = \frac{2\pi}{3}, \frac{4\pi}{3}, 0$

7. Find the exact value of the trig function: $\tan\left(\dfrac{7\pi}{12}\right)$ $\Rightarrow \frac{3\pi}{12} + \frac{4\pi}{12}$

$$\tan\left(\frac{\pi}{4} + \frac{\pi}{3}\right) = \frac{\tan\frac{\pi}{4} + \tan\frac{\pi}{3}}{1 - \tan\frac{\pi}{4}\tan\frac{\pi}{3}}$$

$$= \frac{1+\sqrt{3}}{1-\sqrt{3}}$$

8. Find the exact value of the trig function: $\cos\left(\dfrac{7\pi}{8}\right)$ $\frac{7\pi}{8} \times 2 = \frac{14\pi}{8} = \frac{7\pi}{4}$

* $\cos\theta$ in quad 2

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