Tuesday, April 10, 2018
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Name : KEY Date: ______ Period: ______

Precalculus –Quarter 3 Test Review#2

Chapter 5:

1. Use the fundamental trig identities to write $\sec\theta - \tan\theta\sin\theta$ in terms of $\cos\theta$.

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

2. Verify the identity: $\csc^2\theta\tan^2\theta - 1 = \tan^2\theta$

$$= \frac{1}{\cancel{\sin^2\theta}}\cdot\frac{\cancel{\sin^2\theta}}{\cos^2\theta} - 1 = \frac{1}{\cos^2\theta} - 1 = \sec^2\theta - 1 = \tan^2\theta \checkmark$$

3. Use the sum/difference formulas to find

a. sin 105°

$= \sin(60° + 45°)$

$= \sin 60°\cos 45° + \cos 60°\sin 45°$

$= \left(\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{2}}{2}\right) + \left(\frac{1}{2}\right)\left(\frac{\sqrt{2}}{2}\right) = \boxed{\frac{\sqrt{6}+\sqrt{2}}{4}}$

b. tan 15° $= \tan(60° - 45°)$

$= \dfrac{\tan 60° - \tan 45°}{1 + \tan 60°\tan 45°}$

$= \dfrac{\sqrt{3} - 1}{1 + \sqrt{3}(1)} = \dfrac{(\sqrt{3}-1)}{(1+\sqrt{3})}\cdot\dfrac{(1-\sqrt{3})}{(1-\sqrt{3})}$

$= \dfrac{\sqrt{3} - 3 - 1 + \sqrt{3}}{1 - 3} = \dfrac{2\sqrt{3} - 4}{-2} = \boxed{-\sqrt{3}+2}$

4. Simplify: sin42°cos38° – cos42°sin38°

$\sin(42° - 38°) = \boxed{\sin 4°}$

5. Use the half-angle formulas to find:

$\frac{45}{2} = 22.5°$

a. sin 22.5°

$\sin\frac{45°}{2} = +\sqrt{\frac{1-\cos 45°}{2}} = \sqrt{\frac{1-\frac{\sqrt{2}}{2}}{2}}$

$= \sqrt{\frac{\frac{2-\sqrt{2}}{2}}{2}} = \sqrt{\frac{2-\sqrt{2}}{2}\cdot\frac{1}{2}} = \boxed{\frac{\sqrt{2-\sqrt{2}}}{2}}$

b. $\tan\frac{\pi}{12}$ $\tan\frac{2\pi}{12} = \tan\frac{\pi}{6}$

$= \dfrac{1-\cos\frac{\pi}{6}}{\sin\frac{\pi}{6}} = \dfrac{1-\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \dfrac{\frac{2-\sqrt{3}}{2}}{\frac{1}{2}}$

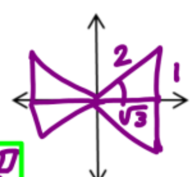
$= \frac{2-\sqrt{3}}{\cancel{2}}\cdot\frac{\cancel{2}}{1} = \boxed{2-\sqrt{3}}$

6. First, find all solutions in the interval [0, 2π). Then, give the general solution.

a. $4\sin^2 x = 1$

$\sqrt{\sin^2 x} = \sqrt{\frac{1}{4}}$

$\sin x = \pm\frac{1}{2}$



$\boxed{x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}}$

General solution!
$x = \frac{\pi}{6} + \pi n \quad x = \frac{5\pi}{6} + \pi n \quad n \in \mathbb{Z}$

b. $\sin 2x = \cos x$ double angle formula

$2\sin x\cos x = \cos x$

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

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

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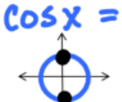
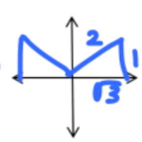
$\cos x = 0$



$\boxed{x = \frac{\pi}{2}, \frac{3\pi}{2}}$

$2\sin x - 1 = 0$

$\sin x = \frac{1}{2}$



$\boxed{x = \frac{\pi}{6}, \frac{5\pi}{6}}$

6b) General solution! $n \in \mathbb{Z}$

$x = \frac{\pi}{2} + \pi n$

$x = \frac{\pi}{6} + 2\pi n$

$x = \frac{5\pi}{6} + 2\pi n$

Answers:

Chapter 5:

1. $\cos\theta$

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

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

$\sec^2\theta - 1$

$\tan^2\theta$

3a. $\frac{\sqrt{6}+\sqrt{2}}{4}$ b. $2-\sqrt{3}$

4. $\sin 4^\circ$

5a. $\frac{\sqrt{2-\sqrt{2}}}{2}$ b. $2-\sqrt{3}$

6a. $x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

$x = \frac{\pi}{6} + \pi n$, where n is an integer

$x = \frac{5\pi}{6} + \pi n$, where n is an integer

b. $x = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{\pi}{6}, \frac{5\pi}{6}$

$x = \frac{\pi}{2} + \pi n$, where n is an integer

$x = \frac{\pi}{6} + 2\pi n$, where n is an integer

$x = \frac{5\pi}{6} + 2\pi n$, where n is an integer