Pre-Calculus A
Section 5.4 Practice Day 2

Name : Key
Date : ______ Period : ____

Simplify the following expressions.

1. $\cos\left(\overset{u}{\theta}-\overset{v}{\frac{3\pi}{2}}\right)$ $= \cos\theta\cos\frac{3\pi}{2}+\sin\theta\sin\frac{3\pi}{2}$

$= \cos\theta\,(0)+\sin\theta\,(-1)$

$= 0-\sin\theta$

$= \boxed{-\sin\theta}$

2. $\sin\left(\frac{3\pi}{2}+\theta\right)$ $= \sin\frac{3\pi}{2}\cos\theta+\cos\frac{3\pi}{2}\sin\theta$

$= (-1)\cos\theta+(0)\sin\theta$

$= \boxed{-\cos\theta}$

3. $\tan(\pi+\theta)$ $= \dfrac{\tan\pi+\tan\theta}{1-\tan\pi\tan\theta} = \dfrac{0+\tan\theta}{1-(0)\tan\theta} = \dfrac{\tan\theta}{1} = \boxed{\tan\theta}$

Prove the following identities.

4. $\sin\left(\frac{\pi}{2}+x\right)=\cos x$

LHS: $\sin\frac{\pi}{2}\cos x+\cos\frac{\pi}{2}\sin x$

$(1)\cos x+(0)\sin x$

$\cos x$

LHS = RHS

$\cos x = \cos x$ ✓

5. $\cos(\pi-\theta)+\sin\left(\frac{\pi}{2}+\theta\right)=0$

LHS: $\cos\pi\cos\theta + \sin\pi\sin\theta + \sin\frac{\pi}{2}\cos\theta + \cos\frac{\pi}{2}\sin\theta$

$\Rightarrow (-1)\cos\theta + \cancel{(0)\sin\theta} + (1)\cos\theta + \cancel{(0)\sin\theta}$

$\Rightarrow -\cos\theta + \cos\theta$

$\Rightarrow 0$

LHS = RHS

$0 = 0$ ✓

Find the solution(s) of the equation in the interval $[0,2\pi)$.

6. $\sin(x+\pi)-\sin x+1=0$

$\sin x\cos\pi + \cos x\sin\pi - \sin x + 1 = 0$

$\sin x(-1) + \cancel{\cos x(0)} - \sin x + 1 = 0$

$-\sin x - \sin x + 1 = 0$

$-2\sin x = -1$

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

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

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

$\cancel{\cos x\cos\frac{\pi}{4}} - \sin x\sin\frac{\pi}{4} - 1 = \cancel{\cos x\cos\frac{\pi}{4}} + \sin x\sin\frac{\pi}{4}$

$-\cos x\cos\frac{\pi}{4} \qquad -\cos x\cos\frac{\pi}{4}$

$\cancel{-\sin x\sin\frac{\pi}{4}} - 1 = \sin x\sin\frac{\pi}{4}$

$+\sin x\sin\frac{\pi}{4} \qquad +\sin x\sin\frac{\pi}{4}$

$-1 = 2\sin x\sin\frac{\pi}{4}$

$-1 = \cancel{2}\left(\frac{\sqrt{2}}{\cancel{2}}\right)\sin x$

$-1 = \sqrt{2}\sin x$

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

$-\frac{\sqrt{2}}{2} = \sin x$

$\boxed{x = \frac{5\pi}{4}, \frac{7\pi}{4}}$

8. $\sin\left(x+\frac{\pi}{6}\right)-\sin\left(x-\frac{\pi}{6}\right)=\frac{1}{2}$

$\sin x\cos\frac{\pi}{6}+\cos x\sin\frac{\pi}{6}-\left(\sin x\cos\frac{\pi}{6}-\cos x\sin\frac{\pi}{6}\right)=\frac{1}{2}$

$\cancel{\sin x\cos\frac{\pi}{6}}+\cos x\sin\frac{\pi}{6}-\cancel{\sin x\cos\frac{\pi}{6}}+\cos x\sin\frac{\pi}{6}=\frac{1}{2}$

$2\cos x\sin\frac{\pi}{6}=\frac{1}{2}$

$\cancel{2}\left(\frac{1}{\cancel{2}}\right)\cos x=\frac{1}{2}$

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

$\boxed{x=\frac{\pi}{3},\frac{5\pi}{3}}$

9. $\sin\left(x+\frac{\pi}{2}\right)-\cos^2 x=0$

$\sin x\cos\frac{\pi}{2}+\cos x\sin\frac{\pi}{2}-\cos^2 x=0$

$\cancel{\sin x(0)}+\cos x(1)-\cos^2 x=0$

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

$\cos x\,(1-\cos x)=0$

$\cos x=0$ $\quad$ $1-\cos x=0$

$\boxed{x=\frac{\pi}{2},\frac{3\pi}{2}}$ $\quad$ $1=\cos x$

$\boxed{x=0}$