Name: KEY Per. ____

Pre-Calculus Test Chapter 5 **Form A** **Show ALL work!!! Step-by-step!!!**

1 Simplify the expression below to $\cos x$.

$$\frac{\cot x}{\csc x}$$

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

$$= \cos x \quad \checkmark$$

2 Simplify the expression below to $\tan x$.

$$\cos\left(\frac{\pi}{2} - x\right)\sec x$$

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

$$= \frac{\sin x}{\cos x}$$

$$= \tan x \quad \checkmark$$

3 Simplify the expression below to $3(\sec x + \tan x)$.

$$\frac{3}{\sec x - \tan x} \quad \frac{(\sec x + \tan x)}{(\sec x + \tan x)}$$

$$= \frac{3(\sec x + \tan x)}{\sec^2 x - \tan^2 x}$$

$$= \frac{3(\sec x + \tan x)}{1}$$

$$= 3(\sec x + \tan x) \quad \checkmark$$

4 Simplify the expression below to $\csc\theta\sec\theta$.

$$\frac{\csc^2\theta}{\cot\theta}$$

$$= \csc\theta \cdot \frac{\csc\theta}{\cot\theta}$$

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

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

$$= \csc\theta\sec\theta \quad \checkmark$$

5 Solve the equation. Find ALL solutions.

$3\sec^2 x - 4 = 0$

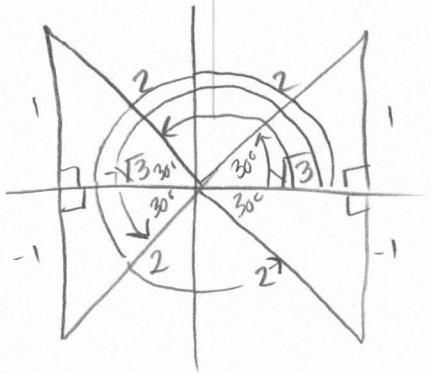
$+4 \quad +4$

$\frac{3\sec^2 x}{3} = \frac{4}{3}$

$\sec^2 x = \frac{4}{3}$

$\sqrt{\sec^2 x} = \pm\sqrt{\frac{4}{3}}$

$\sec x = \pm \frac{2}{\sqrt{3}}$ H / A



30° 150° 210° 330°

180° / π 180 / π

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

OR

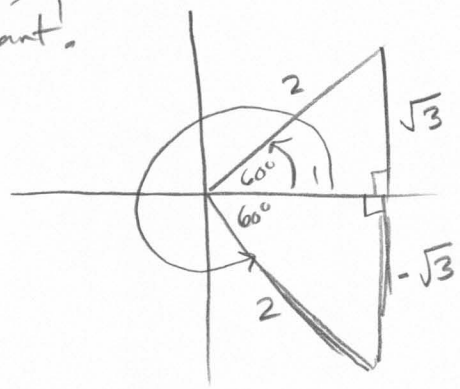
$x = \frac{\pi}{6} + 2\pi n, \quad x = \frac{5\pi}{6} + 2\pi n,$

$x = \frac{7\pi}{6} + 2\pi n, \quad x = \frac{11\pi}{6} + 2\pi n$

6 Solve the equation. Find ALL solutions.

$\cos 2x = \frac{1}{2}$ A / H

Important!



60° 300°

$\frac{2x}{2} = \frac{\frac{\pi}{3} + 2\pi n}{2}$ $\quad \frac{2x}{2} = \frac{\frac{5\pi}{3} + 2\pi n}{2}$

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

7 Find all solutions of the equation in the interval $[0, 2\pi)$.

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

Add 1b

$-1 \quad 2$

-2 ac

Multiply

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

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

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

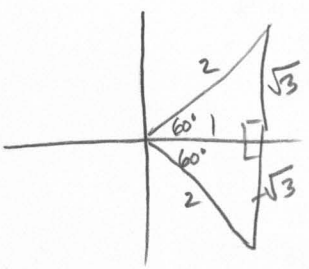
$2\cos x - 1 = 0$ $\quad +1 \quad +1$

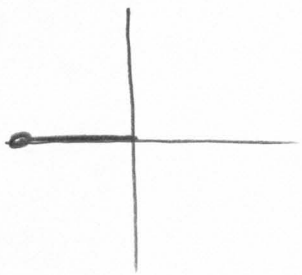
$\frac{2\cos x}{2} = \frac{1}{2}$

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

$\cos x = -1$ $\quad \frac{A}{H} -$ $\quad \frac{1}{1}$ $\quad H+$

$\cos x = \frac{1}{2}$ $\quad \frac{A+}{H+}$





60° $\qquad$ 300° $\qquad$ 180°

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

8 Find all solutions of the equation in the interval $[0, 2\pi)$.

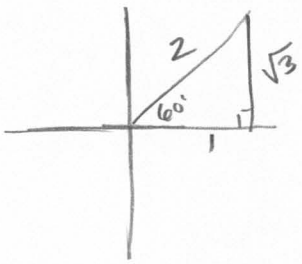
$$\sin\left(x + \frac{\pi}{3}\right) + \sin\left(x - \frac{\pi}{3}\right) = 1$$

$\sin x \cos\frac{\pi}{3} + \cos x \sin\frac{\pi}{3} + \sin x \cos\frac{\pi}{3} - \cos x \sin\frac{\pi}{3} = 1$

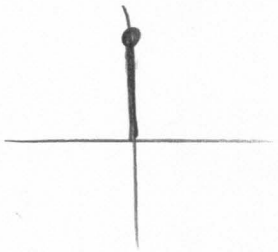
$2\sin x \cos\frac{\pi}{3} = 1$

$\cos\frac{\pi}{3}$ $\qquad \frac{\pi}{3} = 60°$

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



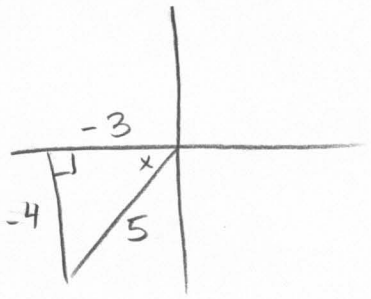
$\sin x = 1$



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

9 Find the exact values of $\sin 2x$, $\cos 2x$, and $\tan 2x$ using double-angle formulas.

$\sin x = -\frac{4}{5}, \pi < x < \frac{3\pi}{2}$ ← Quadrant III



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

$= 2\left(\frac{-4}{5}\right)\left(\frac{-3}{5}\right)$

$= \frac{24}{25}$ $\boxed{\sin 2x = \frac{24}{25}}$

$\cos 2x = 2\cos^2 x - 1$ *One of three options

$= 2\left(-\frac{3}{5}\right)^2 - 1$

$= 2\left(\frac{9}{25}\right) - 1$

$= \frac{18}{25} - \frac{1 \cdot 25}{1 \cdot 25} = \frac{-7}{25}$

$\boxed{\cos 2x = \frac{-7}{25}}$

$\tan 2x = \frac{2\tan x}{1 - \tan^2 x}$

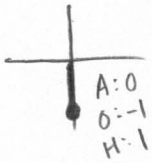
$= \frac{2\left(\frac{-4}{-3}\right)}{1 - \left(\frac{-4}{-3}\right)^2}$

$= \frac{\frac{8}{3}}{\frac{9}{9}\cdot\frac{1}{1} - \frac{16}{9}} = \frac{\frac{8}{3}}{\frac{-7}{9}} \cdot \frac{\frac{9}{7}}{\frac{3}{7}}$

$\boxed{\tan 2x = -\frac{24}{7}}$

10 Use the given information to find all six trigonometric functions.

$\sin\theta = -1, \quad \cot\theta = 0$ ($\frac{O}{H}$, $\frac{A}{O}$)



$\cos\theta = \frac{0}{1} = \boxed{0}$

$\tan\theta = \frac{-1}{0}$ undefined

$\csc\theta = \frac{1}{-1} = \boxed{-1}$

$\sec\theta = \frac{1}{0}$ undefined