Hour: _____ Name: Key

Date: _____

PreCalculus: 5.1-5.3 Practice

You may only use your calculator on those problems that require a calculator.

1. Find all solutions on the interval $[0, 2\pi)$.

a) $2\cos^2\gamma + \cos\gamma = 0$

$2\cos\gamma(\cos\gamma - 1) = 0$

$\cos\gamma = 0$ $\quad\quad$ $\cos\gamma = 1$

$\gamma = \frac{\pi}{2}, \frac{3\pi}{2}$ $\quad\quad$ $\gamma = 0$

b) $\sin^2\theta + \sin\theta - 6 = 0$

$(\sin\theta + 3)(\sin\theta - 2) = 0$

NO SOLUTION

c) $\cos^2 x = 3 - 5\cos x$

$\cos^2 x + 5\cos x - 3 = 0$

USE QUADRATIC FORMULA

$x = \cos^{-1}\left(\frac{-5 + \sqrt{37}}{2}\right)$

d) $2\sin^2 x = 1$

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

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

$x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

Verify the identities. You may only work with <u>one</u> side of the identity.

2. $\dfrac{\cos^3 u + \sin^3 u}{\cos u + \sin u} = 1 - \sin u\cos u$

$\dfrac{(\cos u + \sin u)(\cos^2 u - \sin u\cos u + \sin^2 u)}{\cos u + \sin u}$

$1 - \sin u\cos u$

3. $\sin\theta + \cos\theta = \dfrac{\tan\theta + 1}{\sec\theta}$

$= \frac{\tan\theta}{\sec\theta} + \frac{1}{\sec\theta}$

$= \frac{\sin\theta}{\cos\theta}\cdot\cos\theta + \cos\theta$

$= \sin\theta + \cos\theta$

4. $\dfrac{\sec^2 x}{\cot x} - \tan^3 x = \tan x$

$\dfrac{1 + \tan^2 x}{\cot x} - \tan^3 x$

$\dfrac{1}{\cot x} + \dfrac{\tan^2 x}{\cot x} - \tan^3 x$

$\tan x + \tan^3 x - \tan^3 x$

$\tan x$

5. $\dfrac{\sec x - \cos x}{\tan x} = \sin x$

$\dfrac{\sec x}{\tan x} - \dfrac{\cos x}{\tan x}$

$\dfrac{1}{\cos x} \cdot \dfrac{\cos x}{\sin x} - \dfrac{\cos x}{1} \cdot \dfrac{\cos x}{\sin x}$

$\dfrac{1}{\sin x} - \dfrac{\cos^2 x}{\sin x}$

$\dfrac{1 - \cos^2 x}{\sin x}$

$\dfrac{\sin^2 x}{\sin x}$

$\sin x$

6. $\dfrac{\tan^2 x + 5\tan x + 6}{\sec^2 x - 10} = \dfrac{\tan x + 2}{\tan x - 3}$

$\dfrac{(\tan x + 3)(\tan x + 2)}{1 + \tan^2 x - 10}$

$\dfrac{(\tan x + 3)(\tan x + 2)}{\tan^2 x - 9}$

$\dfrac{(\tan x + 3)(\tan x + 2)}{(\tan x + 3)(\tan x - 3)}$

$\dfrac{\tan x + 2}{\tan x - 3}$

7. $\cos^4 x - \sin^4 x = 2\cos^2 x - 1$

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

$\cos^2 x - (1 - \cos^2 x)$

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

$2\cos^2 x - 1$

8. $\dfrac{1+\sin x}{1-\sin x}-\dfrac{1-\sin x}{1+\sin x}=4\tan x\sec x$

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

$\frac{1+2\sin x+\sin^2 x}{1-\sin^2 x}-\frac{1-2\sin x+\sin^2 x}{1-\sin^2 x}$

$\frac{4\sin x}{\cos^2 x}$

$4\tan x\sec x$

9. $\left(1+\sin^2 x\right)^2=\cos^4 x+4\sin^2 x$

$=(\cos^2 x)^2+4\sin^2 x$

$=(1-\sin^2 x)^2+4\sin^2 x$

$=1-2\sin^2 x+\sin^4 x+4\sin^2 x$

$=1+2\sin^2 x+\sin^4 x$

$=(1+\sin^2 x)^2$

10. $\csc x\left(\csc x-\sin x\right)+\dfrac{\sin x-\cos x}{\sin x}+\cot x=\csc^2 x$

$\csc^2 x-\csc x\sin x+\frac{\sin x}{\sin x}-\frac{\cos x}{\sin x}+\cot x$

$\csc^2 x-1+1-\cot x+\cot x$

$\csc^2 x$

11. $\dfrac{1+\sin x}{1-\sin x}=2\sec^2 x+2\sec x\tan x-1$

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

$\frac{1+2\sin x+\sin^2 x}{1-\sin^2 x}$

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

$\sec^2 x+2\sec x\tan x+\tan^2 x$

$\sec^2 x+2\sec x\tan x+\sec^2 x-1$

$2\sec^2 x+2\sec x\tan x-1$