Precalculus
9.1-9.2 Partner Test 2015 Name:____________________
Non-Calculator

Prove the following identities. Show all solution steps for full credit!

1. $\sec^4 x - \tan^4 x = 2\tan^2 x + 1$

$(\sec^2 x - \tan^2 x)(\sec^2 x + \tan^2 x)$

$1(1 + \tan^2 x + \tan^2 x)$

$1 + 2\tan^2 x$

2. $\csc x(\csc x + \cot x) = \dfrac{1}{1 - \cos x}$

$\frac{1}{\sin x}\left(\frac{1}{\sin x} + \frac{\cos x}{\sin x}\right)$

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

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

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

$\frac{1 + \cos x}{(1 - \cos x)(1 + \cos x)} = \frac{1}{1 - \cos x}$

3. $\dfrac{\cot x}{\csc x - \sin x} = \sec x$

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

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

$\dfrac{\frac{\cos x}{\sin x}}{\frac{\cos^2 x}{\sin x}}$ $\quad \frac{\cos x}{\sin x} \cdot \frac{\sin x}{\cos^2 x} = \frac{1}{\cos x}$

$= \sec x$

4. $\sin x \sin y = \frac{1}{2}[\cos(x - y) - \cos(x + y)]$

$\frac{1}{2}[(\cos x \cos y + \sin x \sin y) - (\cos x \cos y - \sin x \sin y)]$

$\frac{1}{2}[2 \sin x \sin y]$

$\sin x \sin y$

5. **Simplify:** sin 7 cos 3 + cos 7 sin 3

$\sin(7+3)$

$\sin(10)$

5. $\sin(10)$

6. **Simplify:** $\cos(x - y)\cos y - \sin(x - y)\sin y$

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

$\cos x$

6. $\cos x$

7. **Simplify:** $\tan(\pi + x)$	8. **Simplify:** $\cos\left(\frac{\pi}{2} - x\right)$
$\tan\pi = 0$ $\frac{\tan\pi + \tan x}{1 - \tan\pi\tan x} = \frac{0 + \tan x}{1 - 0\cdot\tan x}$ $= \frac{\tan x}{1} = \tan x$ 7. $\tan x$	$\cos\frac{\pi}{2} = 0$, $\sin\frac{\pi}{2} = 1$ $\cos\frac{\pi}{2}\cos x + \sin\frac{\pi}{2}\sin x$ $0\cdot\cos x + 1\cdot\sin x$ $0 + \sin x$ $\sin x$ 8. $\sin x$

For #9-10, use Addition and Subtraction Identities to find the **exact** values. **RATIONALIZE!!!**

9. $\cos\frac{5\pi}{12}$

$\cos\left(\frac{3\pi}{12} + \frac{2\pi}{12}\right)$

$\cos\left(\frac{\pi}{4} + \frac{\pi}{6}\right)$

$\cos\frac{\pi}{4}\cos\frac{\pi}{6} - \sin\frac{\pi}{4}\sin\frac{\pi}{6}$

$\frac{\sqrt{2}}{2}\cdot\frac{\sqrt{3}}{2} - \frac{\sqrt{2}}{2}\cdot\frac{1}{2}$

$\frac{\sqrt{6}}{4} - \frac{\sqrt{2}}{4}$

9. $\frac{\sqrt{6}-\sqrt{2}}{4}$

10. $\tan 75°$

$\tan(30 + 45)$

$\frac{\tan 30 + \tan 45}{1 - \tan 30\tan 45} = \frac{\frac{\sqrt{3}}{3} + 1}{1 - \frac{\sqrt{3}}{3}}$

$\frac{(3+\sqrt{3})}{(3+\sqrt{3})}\cdot\frac{3+\sqrt{3}}{3-\sqrt{3}} = \frac{9 + 6\sqrt{3} + 3}{9 - 3} = \frac{12 + 6\sqrt{3}}{6} = 2 + \sqrt{3}$

10. $2 + \sqrt{3}$

11. Given: $\cos x = -\frac{4}{5}$, *where* $\frac{\pi}{2} < x < \pi$, evaluate and simplify $\cos\left(\frac{\pi}{4} + x\right)$. Find the **exact** value.

2nd quad.

$(-4)^2 + y^2 = 5^2$

$16 + y^2 = 25$

$y^2 = 9$

$y = 3$

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

$\frac{\sqrt{2}}{2}\cdot\frac{-4}{5} - \frac{\sqrt{2}}{2}\cdot\frac{3}{5}$

$\frac{-4\sqrt{2}}{10} - \frac{3\sqrt{2}}{10} = \frac{-7\sqrt{2}}{10}$

11. $\frac{-7\sqrt{2}}{10}$

12. Given: $\sin x = \frac{4}{5}$, *where* $0 < x < \frac{\pi}{2}$ *and* $\csc y = \frac{13}{5}$, *where* $\frac{\pi}{2} < y < \pi$. Find $\sin(x + y)$. Find the exact value.

1st; 2nd; $\frac{1}{\sin}$ or $\frac{H}{O}$

$4^2 + x^2 = 5^2$

$16 + x^2 = 25$

$x^2 = 9$

$x = 3$

$5^2 + x^2 = 13^2$

$25 + x^2 = 169$

$x^2 = 144$

$x = 12$

$\sin(x+y) = \sin x\cos y + \sin y\cos x$

$= \frac{4}{5}\cdot\frac{-12}{13} + \frac{5}{13}\cdot\frac{3}{5}$

$\frac{-48}{65} + \frac{15}{65}$

$-\frac{33}{65}$

12. $-\frac{33}{65}$

Precalculus
9.1-9.2 Partner Test 2015
Non-Calculator

Name:______________________________

Prove the following identities. Show all solution steps for full credit!

1. $\sec^4 x - \tan^4 x = 2\tan^2 x + 1$	2. $\csc x(\csc x + \cot x) = \dfrac{1}{1-\cos x}$
3. $\dfrac{\cot x}{\csc x - \sin x} = \sec x$	4. $\sin x \sin y = \frac{1}{2}[\cos(x-y) - \cos(x+y)]$
5. **Simplify:** $\sin 7 \cos 3 + \cos 7 \sin 3$ 5.____________________	6. **Simplify:** $\cos(x-y)\cos y - \sin(x-y)\sin y$ 6.____________________

7. **Simplify:** $\tan(\pi + x)$ 7.____________________	8. **Simplify:** $\cos\left(\frac{\pi}{2} - x\right)$ 8.____________________

For #9-10, use Addition and Subtraction Identities to find the **exact** values. **<u>RATIONALIZE!!!</u>**

9. $\cos\frac{5\pi}{12}$

10. $\tan 75^\circ$

9.____________________

10.____________________

11. Given: $\cos x = -\frac{4}{5}$, *where* $\frac{\pi}{2} < x < \pi$, evaluate and simplify $\cos\left(\frac{\pi}{4} + x\right)$. Find the **exact** value.

11.____________________

12. Given: $\sin x = \frac{4}{5}$, *where* $0 < x < \frac{\pi}{2}$ *and* $\csc y = \frac{13}{5}$, *where* $\frac{\pi}{2} < y < \pi$. Find $\sin(x + y)$. Find the exact value.

12.____________________