TRIG 5.1 – 5.3 Practice Test (Solutions on back)

Name _____ Date _____

Verify each identity. Show all steps and be clear with each step. State the side with which you are starting. LHS versus RHS (Identities 2 points each)

1) $3\tan x \csc x \sin x \cot x = 3$

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

3) $\dfrac{\tan x \cot x}{\sec x} = \cos x$

4) $\dfrac{\cos x}{1 - \sin x} + \dfrac{1 - \sin x}{\cos x} = 2\sec x$

5) $\dfrac{\tan^2 x - \cot^2 x}{\cot x + \tan x} = \tan x - \cot x$

6) $\dfrac{\cos(x + y)}{\sin x \sin y} = \cot x \cot y - 1$

Find the exact value of each. Show all work as I am well aware that some calculators display exact values.

7) $\cos(60° + 45°)$ 7) _____

TRIG 5.1 – 5.3 Practice

8) $\sin(30^\circ - 45^\circ)$ 8) _____

9) $\cos 7\pi/12 \cos 5\pi/12 + \sin 7\pi/12 \sin 5\pi/12$ 9) _____

10) $\sin 70^0 \cos 10^0 - \sin 10^0 \cos 70^0$ 10) _____

11) $\cos(7\pi/12)$ 11) _____

12) $\cos(195^\circ)$ 12) _____

13) $\tan(2\pi/3 - \pi/4)$ 13) _____

Given that x is in Quadrant III and y is in Quadrant II, find a) $\sin(x+y)$ b) $\cos(x+y)$ c) $\tan(x+y)$

14) $\sin x = -5/13$ $\sin y = 4/5$ 14) a) _____

b) _____

c) _____

Use a double angle formula to find the exact value of each, if $\sin x = -4/5$ x is in Quadrant III.

15) $\sin 2x$ 15) _____

16) $\cos 2x$ 16) _____

17) $\tan 2x$ 17) _____

Trig Double-Angle and Half-Angle Practice

Name _____ Date _____

Use a **double angle** formula to find the exact value of each.
Given sinx = -3/5 x is in **Quadrant III.**

1) sin2x 1) _____

2) cos2x 2) _____

3) tan2x 3) _____

Use a **half angle** formula to find the exact value of each.

4) $\sin 15^0$ 4) _____

5) $\cos 7\pi/12$ 5) _____

6) $\sin 112.5^0$ 6) _____

7) $\cos 75^0$ 7) _____

8) If cosx = 12/13 and x is in Quadrant IV, find cos(x/2) 8) _____

9) If sinx = -1/10 and x is in Quadrant III, find tan(x/2). 9) _____

Trig Double-Angle and Half-Angle · Practice

Verify each identity. State with which side you are working (LHS) or (RHS).

10) $\sin^2 x + \cos 2x = \cos^2 x$ [Hint: Double Angle]

11) $1 + \sin 2x = \cos^2 x + \sin^2 x + 2\sin x\cos x$ [Hint: Double Angle]

12) $\sec^2 x = \dfrac{2}{1 + \cos 2x}$ [Hint: Double Angle]

13) $\sin(x + 270^0) = -\cos x$ [Hint: Santa Claus]

BONUS: Reduce the power of $12\sin^4 x$. Have fun!

$$12\sin^2 x\sin^2 x = 12\left(\frac{1-\cos 2x}{2}\right)\left(\frac{1-\cos 2x}{2}\right) = \frac{12}{4}\left(1 - 2\cos 2x + \cos^2 2x\right)$$

$$= 3\left(1 - 2\cos 2x + \left[\frac{1+\cos 4x}{2}\right]\right) = 3\left(1 - 2\cos 2x + \frac{1}{2} + \frac{1}{2}\cos 4x\right)$$

$$= 3\left(\frac{3}{2} - 2\cos 2x + \frac{1}{2}\cos 4x\right) = \boxed{\frac{9}{2} - 6\cos 2x + \frac{3}{2}\cos 4x}$$

5.1-5.3 Practice Quiz - Answer Key

1. $3\tan x \csc x \sin x \cot x \overset{?}{=} 3$

LHS $3(1)(1) = 3$ ✓

2. $\sin^2 x\,(1+\tan^2 x) \overset{?}{=} \tan^2 x$

LHS $= \sin^2 x\,(\sec^2 x)$

$= \sin^2 x\left(\frac{1}{\cos^2 x}\right) = \frac{\sin^2 x}{\cos^2 x} = \tan^2 x$ ✓

3. $\frac{\overbrace{\tan x \cot x}^{1}}{\sec x} \overset{?}{=} \cos x$

LHS $\frac{1}{\sec x} = \cos x$ ✓

4. $\frac{\cos x}{1-\sin x} + \frac{1-\sin x}{\cos x} \overset{?}{=} 2\sec x$ LCD $= (1-\sin x)(\cos x)$

LHS $= \frac{\cos x(\cos x) + (1-\sin x)(1-\sin x)}{(1-\sin x)(\cos x)} = \frac{\overbrace{\cos^2 x + 1 - 2\sin x + \sin^2 x}^{1}}{(1-\sin x)(\cos x)}$

factor

$= \frac{2-2\sin x}{(1-\sin x)(\cos x)} = \frac{2(1-\sin x)}{(1-\sin x)(\cos x)} = \frac{2}{\cos x} = 2\sec x$ ✓

factor

5. $\frac{\tan^2 x - \cot^2 x}{\cot x + \tan x} \overset{?}{=} \tan x - \cot x$

LHS $= \frac{(\tan x + \cot x)(\tan x - \cot x)}{\cot x + \tan x}$

$= \tan x - \cot x$

6. $\frac{\cos(x+y)}{\sin x \sin y} \overset{?}{=} \cot x \cot y - 1$

LHS

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

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

$= \cot x \cot y - 1$ ✓

7. $\frac{\sqrt{2}-\sqrt{6}}{4}$ 8. $\frac{\sqrt{2}-\sqrt{6}}{4}$ 9. $\sqrt{3}/2$ 10. $\sqrt{3}/2$

11. $\frac{\sqrt{2}-\sqrt{6}}{4}$ 12. $\frac{-\sqrt{6}-\sqrt{2}}{4}$ 13. $\sqrt{3}+2$

14. a) $\frac{-33}{65}$ b) $\frac{56}{65}$ c) $\frac{-33}{56}$

15. $\frac{24}{25}$ 16. $\frac{-7}{25}$ 17. $\frac{-24}{7}$

Trig Double-Angle and Half-Angle Quiz Key

1) $\frac{24}{25}$ 2) $\frac{7}{25}$ 3) $\frac{24}{7}$ 4) $\frac{\sqrt{2-\sqrt{3}}}{2}$ 5) $\frac{-\sqrt{2-\sqrt{3}}}{2}$

6) $\frac{\sqrt{2+\sqrt{2}}}{2}$ 7) $\frac{\sqrt{2-\sqrt{3}}}{2}$ 8) $\frac{-5\sqrt{26}}{26}$ 9) $-10-3\sqrt{11}$

10) $\sin^2 x + \cos 2x \stackrel{?}{=} \cos^2 x$

LHS $= \sin^2 x + \cos^2 x - \sin^2 x$

$= \cos^2 x$ ✓

11) $1 + \sin 2x \stackrel{?}{=} \underbrace{\cos^2 x + \sin^2 x}_{1} + \underbrace{2\sin x \cos x}_{\sin 2x}$

RHS $= 1 + \sin 2x$ ✓

12) $\sec^2 x \stackrel{?}{=} \frac{2}{1+\cos 2x}$

LHS $= \frac{2}{1+(2\cos^2 x - 1)} = \frac{2}{2\cos^2 x}$

$= \frac{1}{\cos^2 x} = \sec^2 x$ ✓

13) $\sin(x+270^\circ) \stackrel{?}{=} -\cos x$

LHS $= \sin x \cos 270^\circ + \sin 270^\circ \cos x$

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

$= -\cos x$ ✓