Notes: 7.1 Put on bright yellow paper!

*Reciprocal Identities:

$$\sin\theta = \frac{1}{\csc\theta} \qquad \csc\theta = \frac{1}{\sin\theta}$$

$$\cos\theta = \frac{1}{\sec\theta} \qquad \sec\theta = \frac{1}{\cos\theta}$$

$$\tan\theta = \frac{1}{\cot\theta} \qquad \cot\theta = \frac{1}{\tan\theta}$$

→*Leave a little space between each type of identity!!*

*Quotient Identities:

$$\frac{\sin\theta}{\cos\theta} = \tan\theta \qquad \frac{\cos\theta}{\sin\theta} = \cot\theta$$

→*Leave a little space between each type of identity!!*

*Pythagorean Identities:

$$\sin^2\theta + \cos^2\theta = 1$$

(or) $(\sin\theta)^2 + (\cos\theta)^2 = 1$

$$1 + \cot^2\theta = \csc^2\theta$$

$$\tan^2\theta + 1 = \sec^2\theta$$

→*Leave a little space between each type of identity!!*

Double Angle Identities:

$$\sin 2\theta = 2\sin\theta\cos\theta$$

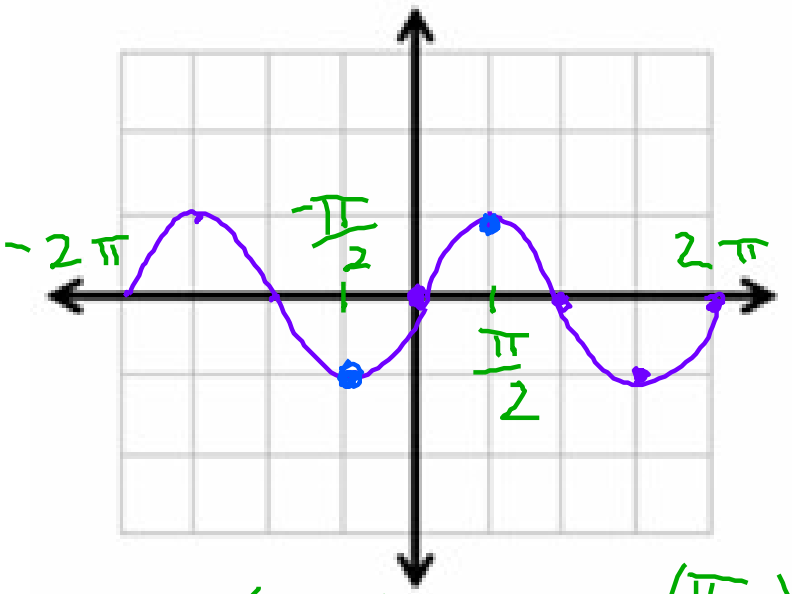
$$\cos 2\theta = \cos^2\theta - \sin^2\theta$$

$$\overset{\text{DR}}{=} 1 - 2\sin^2\theta$$

$$\overset{\text{DR}}{=} 2\cos^2\theta - 1$$

*Opposite Angle Identities:

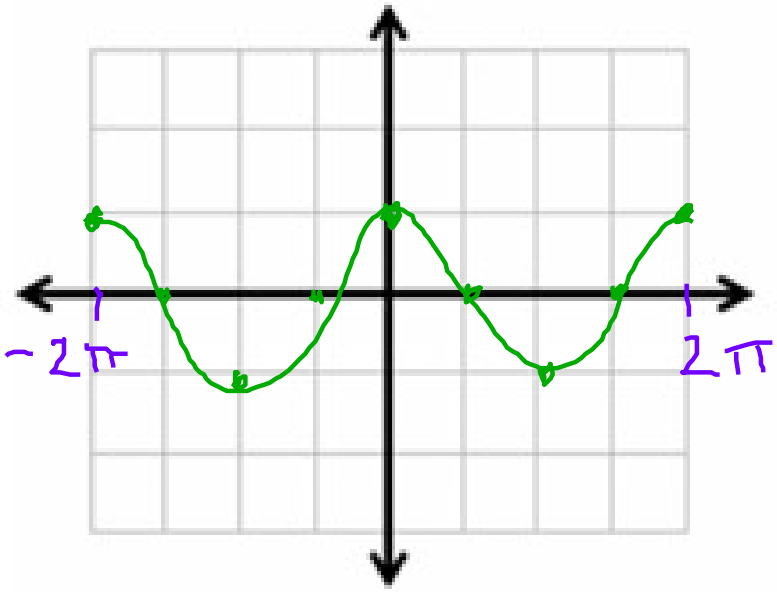
$\sin(-\theta) = -\sin\theta$



$\sin\left(-\frac{\pi}{2}\right) = -\sin\left(\frac{\pi}{2}\right)$

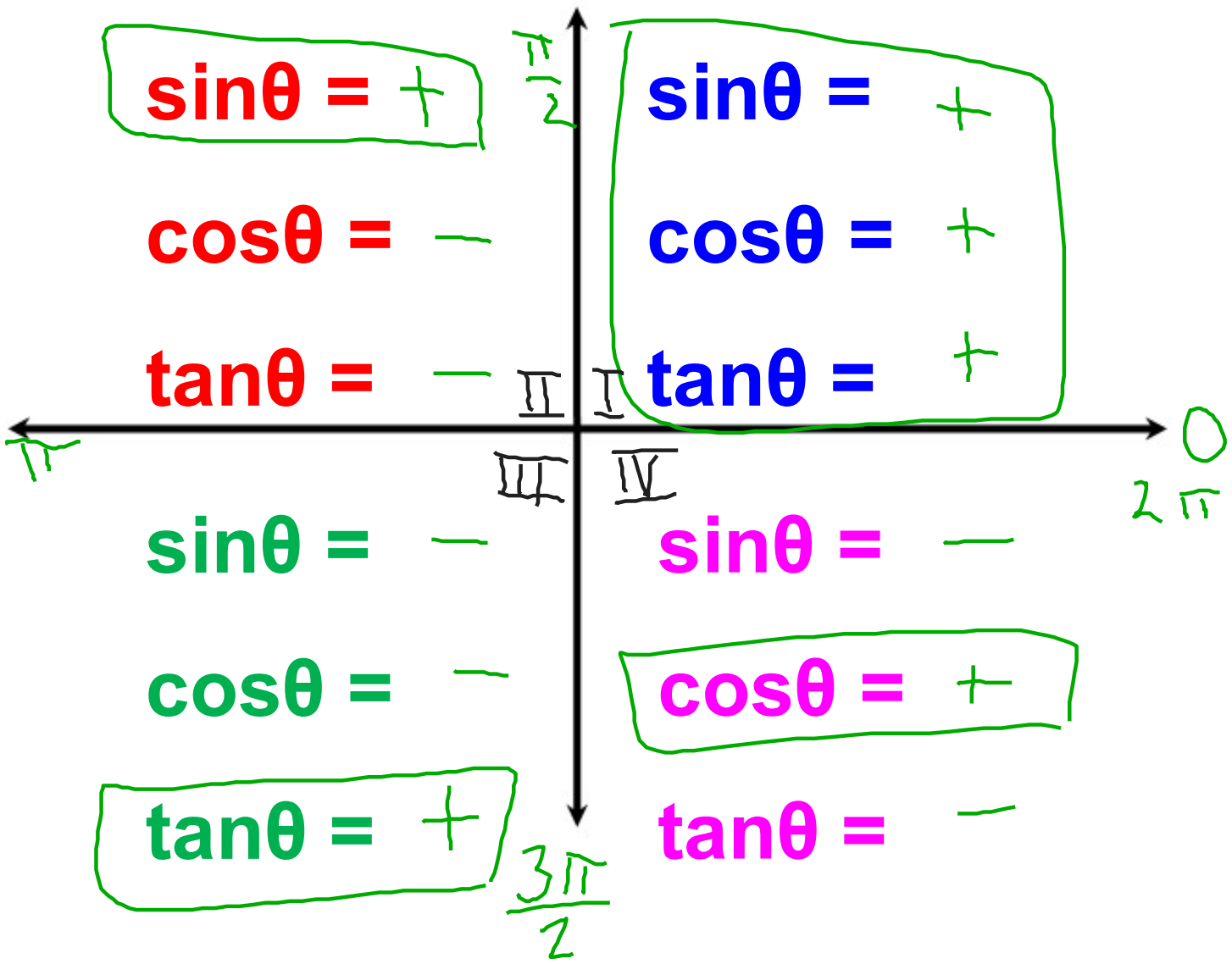
$-1 = -1$

$\cos(-\theta) = \cos\theta$



$\cos(-2\pi) = \cos(2\pi)$

$1 = 1$



From Ch. 5 & 6:

$\sin\theta = y$ or $\frac{y}{r}$

$\cos\theta = x$ $\frac{x}{r}$

$\tan\theta = \frac{y}{x}$ $\frac{y}{x}$

unit circle

$r = 1$

CH.7 INTRODUCTION TO IDENTITIES **Name:** **Per:**

#1-19: SHOW ALL WORK. YOU MUST USE IDENTITIES TO SOLVE EACH PROBLEM!

a. **Write identity**
b. **Plug in values**
c. **Show work and solve**

Use the given information to determine the exact trigonometric value.

1. $\cot\theta = -\frac{\sqrt{5}}{2}$, $\frac{\pi}{2} < \theta < \pi$; $\tan\theta$

2. $\sin\theta = -\frac{1}{5}$, $\pi < \theta < \frac{3\pi}{2}$; $\cos\theta$

Simplify each expression.

3. $\frac{\csc\theta}{\cot\theta}$

4. (cosx)(cscx)(tanx)

5. $\frac{\sin 2\theta}{\cos\theta} \cdot \cot\theta$

CHECK ANSWERS:

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

$-\frac{2\sqrt{6}}{5}$ $-\frac{3\sqrt{13}}{13}$ $\frac{4\sqrt{3}}{3}$

$-\frac{2\sqrt{6}}{7}$ $\frac{\sqrt{2}}{4}$ $\frac{\sqrt{5}}{3}$ $\frac{\sqrt{15}}{4}$

sinx + cosx 1 2

cosx cscx

cscθ secθ

2cotθ 2cosθ

Determine an exact value using identities:

1. $\cot\theta = -\frac{\sqrt{5}}{2}$ given $\qquad \frac{\pi}{2} < \theta < \pi$ $\qquad$ find $\tan\theta = ?$

$\frac{\pi}{2} < \theta < \pi$ is II

$\tan\theta = -$

$$\tan\theta = \frac{1}{\cot\theta} = \frac{1}{-\frac{\sqrt{5}}{2}} = -\frac{2}{\sqrt{5}} = -\frac{2\sqrt{5}}{5}$$

CHECK ANSWERS:

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

$-\frac{2\sqrt{6}}{5}$ $\quad -\frac{3\sqrt{13}}{13}$ $\quad \frac{4\sqrt{3}}{3}$

$-\frac{2\sqrt{6}}{7}$ $\quad \frac{\sqrt{2}}{4}$ $\quad \frac{\sqrt{5}}{3}$ $\quad \frac{\sqrt{15}}{4}$

$\sin x + \cos x$	1	2
$\cos x$	$\csc x$	
$\csc\theta$	$\sec\theta$	
$2\cot\theta$	$2\cos\theta$	

*Reciprocal Identities:

$$\sin\theta = \frac{1}{\csc\theta} \qquad \csc\theta = \frac{1}{\sin\theta}$$

$$\cos\theta = \frac{1}{\sec\theta} \qquad \sec\theta = \frac{1}{\cos\theta}$$

$$\tan\theta = \frac{1}{\cot\theta} \qquad \cot\theta = \frac{1}{\tan\theta}$$

*Quotient Identities:

$$\frac{\sin\theta}{\cos\theta} = \tan\theta \qquad \frac{\cos\theta}{\sin\theta} = \cot\theta$$

*Pythagorean Identities:

$$\sin^2\theta + \cos^2\theta = 1 \qquad 1 + \cot^2\theta = \csc^2\theta$$

$$\tan^2\theta + 1 = \sec^2\theta$$

Double Angle Identities:

$$\sin 2\theta = 2\sin\theta\cos\theta$$

$$\cos 2\theta = \cos^2\theta - \sin^2\theta$$

$$\text{or} = 1 - 2\sin^2\theta$$

$$\text{or} = 2\cos^2\theta - 1$$

*Opposite Angle Identities:

$$\sin(-\theta) = -\sin\theta \qquad \cos(-\theta) = \cos\theta$$

Determine an exact value using identities:

2. $\sin\theta = -\frac{1}{5}$ $\qquad \pi < \theta < \frac{3\pi}{2}$ $\qquad$ find $\cos\theta$

III $\quad \cos = -$

$\sin^2\theta + \cos^2\theta = 1$

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

$\frac{1}{25} + \cos^2\theta = 1$

$\cos^2\theta = 1 - \frac{1}{25}$

$\sqrt{\cos^2\theta} = \sqrt{\frac{24}{25}}$

$\cos\theta = -\frac{2\sqrt{6}}{5}$

CHECK ANSWERS:

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

$-\frac{2\sqrt{6}}{5}$ $\quad -\frac{3\sqrt{13}}{13}$ $\quad \frac{4\sqrt{3}}{3}$

$-\frac{2\sqrt{6}}{7}$ $\quad \frac{\sqrt{2}}{4}$ $\quad \frac{\sqrt{5}}{3}$ $\quad \frac{\sqrt{15}}{4}$

sinx + cosx	1	2
cosx	cscx	
cscθ	secθ	
2cotθ	2cosθ	

Simplify each expression:

3. $\dfrac{\csc\theta}{\cot\theta} = \dfrac{\frac{1}{\sin\theta}}{\frac{\cos\theta}{\sin\theta}} = \dfrac{1}{\sin\theta} \cdot \dfrac{\sin\theta}{\cos\theta} = \dfrac{1}{\cos\theta} = \sec\theta$

4. $(\cos x)(\csc x)(\tan x)$

CHECK ANSWERS:

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

$-\frac{2\sqrt{6}}{5}$ $-\frac{3\sqrt{13}}{13}$ $\frac{4\sqrt{3}}{3}$

$-\frac{2\sqrt{6}}{7}$ $\frac{\sqrt{2}}{4}$ $\frac{\sqrt{5}}{3}$ $\frac{\sqrt{15}}{4}$

sinx + cosx	1	2
cosx	cscx	
cscθ	~~secθ~~	
2cotθ	2cosθ	

Simplify each expression:

5. $\dfrac{\sin 2\theta}{\cos\theta} \cdot \cot\theta$

$\dfrac{2\sin\theta\cos\theta}{\cos\theta} \cdot \dfrac{\cos\theta}{\sin\theta} = 2\cos\theta$

CHECK ANSWERS:

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

$-\frac{2\sqrt{6}}{5}$ $-\frac{3\sqrt{13}}{13}$ $\frac{4\sqrt{3}}{3}$

$-\frac{2\sqrt{6}}{7}$ $\frac{\sqrt{2}}{4}$ $\frac{\sqrt{5}}{3}$ $\frac{\sqrt{15}}{4}$

sinx + cosx 1 2

cosx cscx

cscθ secθ

2cotθ ~~2cosθ~~

CLEARLY SHOW ALL WORK ON A SEPARATE SHEET OF PAPER OR ON THE BACK OF THIS PAPER.

Use the given information to determine the exact trigonometric value.

6. $\sin\theta = \frac{\sqrt{3}}{4}$, $0 < \theta < \frac{\pi}{2}$; $\csc\theta$

7. $\sin\theta = \frac{1}{4}$, $0 < \theta < \frac{\pi}{2}$; $\cos\theta$

8. $\cos\theta = -\frac{2}{3}$, $\frac{\pi}{2} < \theta < \pi$; $\sin\theta$

9. $\csc\theta = \frac{\sqrt{11}}{3}$, $\frac{\pi}{2} < \theta < \pi$; $\cot\theta$

10. $\sec\theta = -\frac{5}{4}$, $\frac{\pi}{2} < \theta < \pi$; $\tan\theta$

11. $\sin\theta = -\frac{1}{3}$, $\pi < \theta < \frac{3\pi}{2}$; $\tan\theta$

12. $\tan\theta = \frac{2}{3}$, $\pi < \theta < \frac{3\pi}{2}$; $\cos\theta$

13. $\sec\theta = -\frac{7}{5}$, $\pi < \theta < \frac{3\pi}{2}$; $\sin\theta$

Simplify each expression.

14. $\frac{\sec x}{\tan x}$

15. $\frac{\cot\theta}{\cos\theta}$

16. $\left(\csc^2\theta\right)\left(\sin 2\theta\right)$

17. $\cos x \cdot \tan x + \sin x \cdot \cot x$

18. $\sin x \cdot \cos x \cdot \sec x \cdot \cot x$

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

hint: square each part, then combine like terms

reminder: $(x + y)^2 = x^2 + 2xy + y^2$