BOARD NOTES

29 JANUARY 2019

CC TRIGONOMETRY
CHAPTER 1 ANGLES AND TRIGONOMETRIC FUNCTIONS

SECTION 1.3 - Trigonometric

Functions of Any Angle

Objectives:

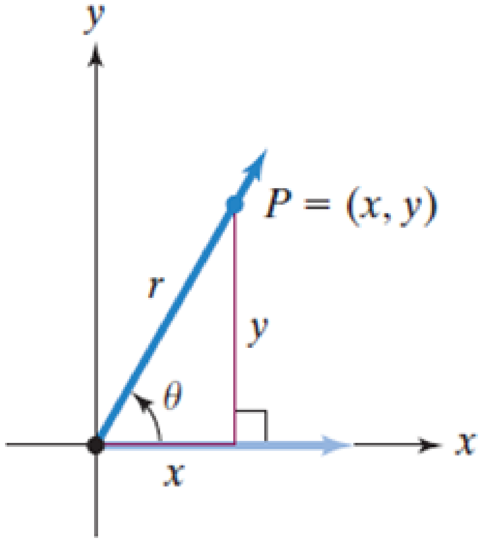
- Use the definitions of trigonometric functions of any angle
- Use the signs of the trigonometric functions
- Find reference angles
- Use reference angles to evaluate trigonometric functions

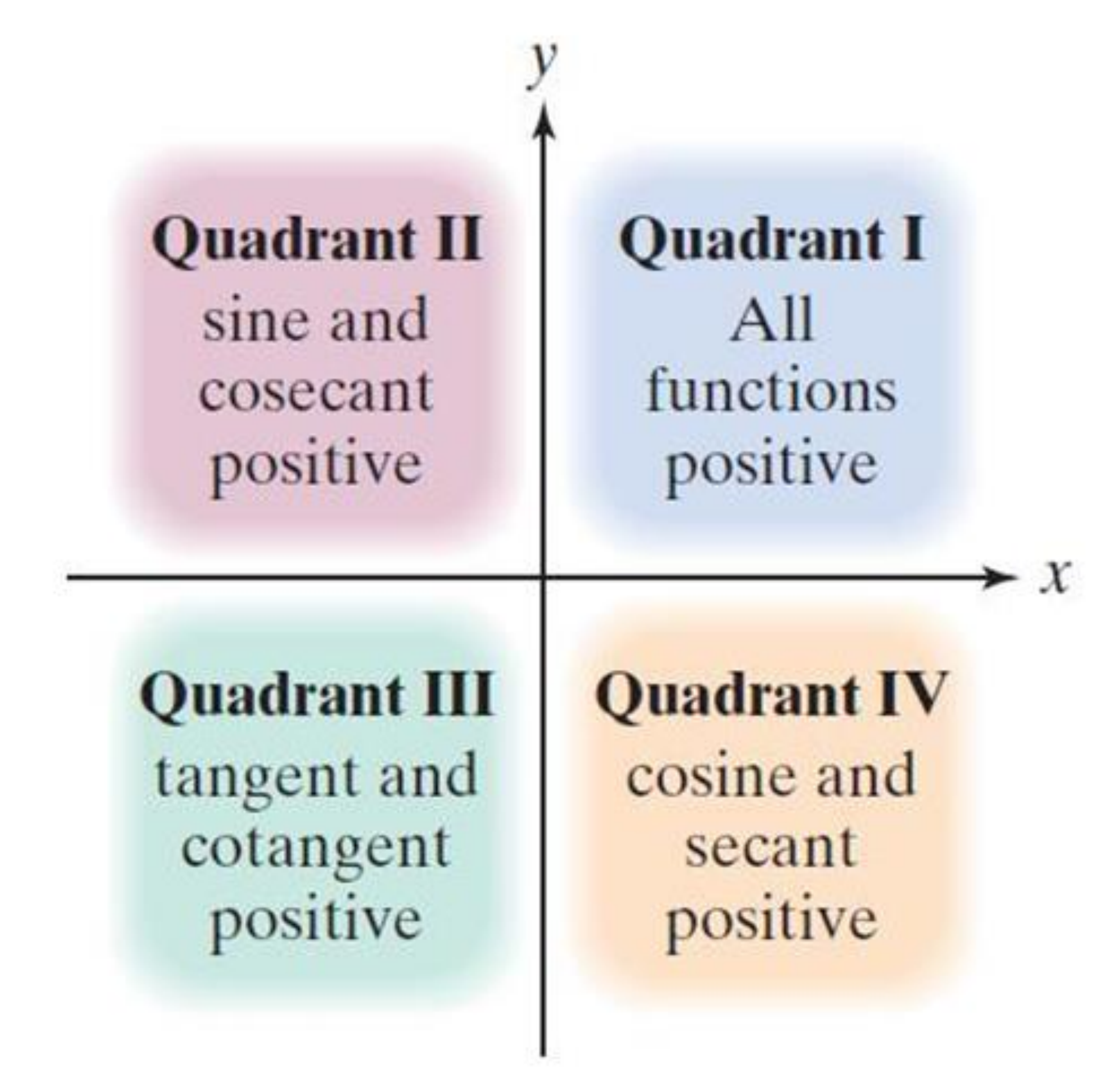
Let θ be any angle in standard position and let $P = (x, y)$ be a point on the terminal side of θ. If $r = \sqrt{x^2 + y^2}$ is the distance from (0, 0) to (x, y), the **six trigonometric functions** of θ are defined by the following ratios:

$$\sin\theta = \frac{y}{r} \qquad \csc\theta = \frac{r}{y}, y \neq 0$$

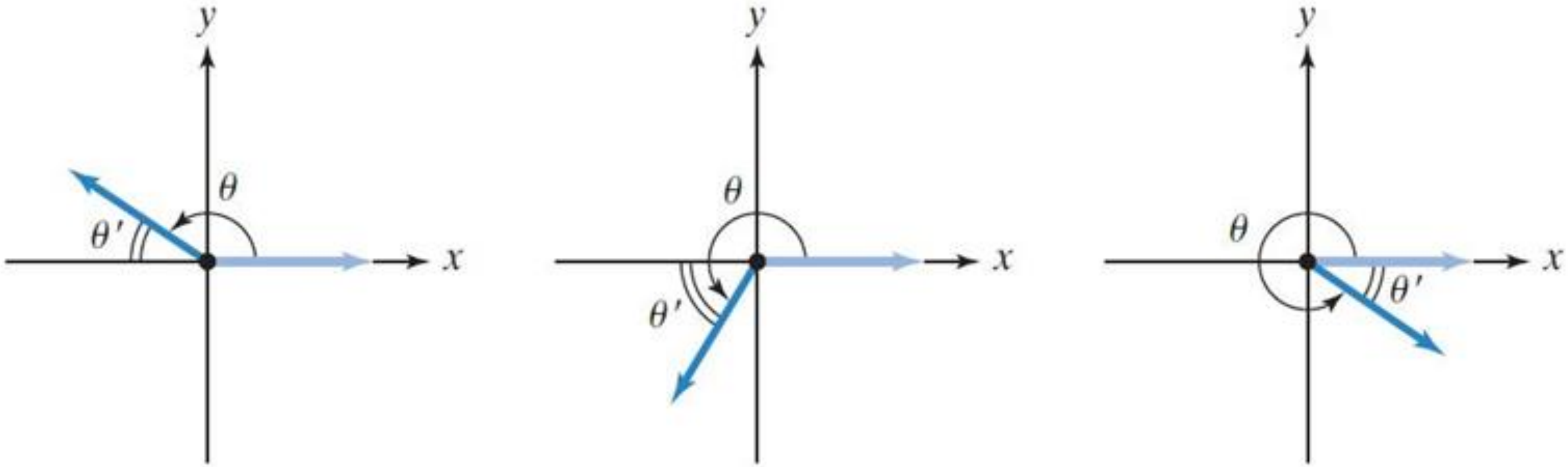
$$\cos\theta = \frac{x}{r} \qquad \sec\theta = \frac{r}{x}, x \neq 0$$

$$\tan\theta = \frac{y}{x}, x \neq 0 \qquad \cot\theta = \frac{x}{y}, y \neq 0$$




y
x
Quadrant II
sine and cosecant positive
Quadrant I
All functions positive
Quadrant III
tangent and cotangent positive
Quadrant IV
cosine and secant positive

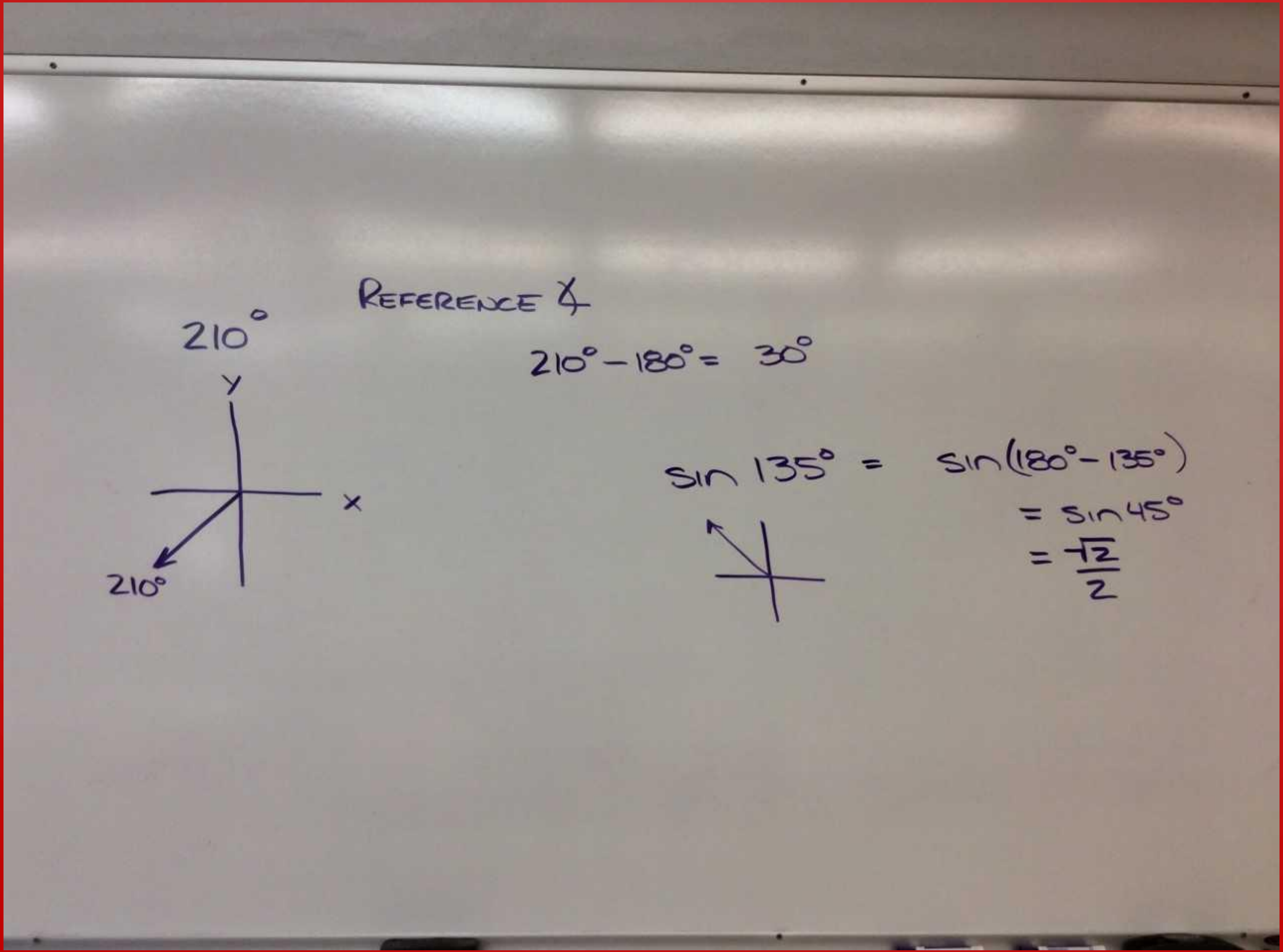
Let θ be a nonacute angle in standard position that lies in a quadrant. Its reference angle is the positive acute angle



If $90° < \theta < 180°$, then $\theta' = 180° - \theta$.

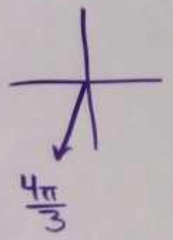
If $180° < \theta < 270°$, then $\theta' = \theta - 180°$.

If $270° < \theta < 360°$, then $\theta' = 360° - \theta$.

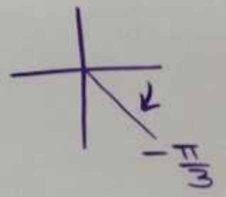


REFERENCE ∡
210°
$210° - 180° = 30°$
Y
X
210°
$\sin 135° = \sin(180° - 135°)$
$= \sin 45°$
$= \frac{\sqrt{2}}{2}$

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



$$\cot\left(-\frac{\pi}{3}\right) = -\cot\left(\frac{\pi}{3}\right) = -\left(\frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}}\right) = -\frac{\sqrt{3}}{3}$$



CC TRIGONOMETRY
CHAPTER 1 ANGLES AND TRIGONOMETRIC FUNCTIONS

SECTION 1.4 - The Unit Circle

Objectives:

- Use the unit circle to define trig functions
- Recognize the domain and range of sine and cosine
- Use even and odd properties
- Use periodic properties

If t is a real number and $P = (x, y)$ is the point on the unit circle that corresponds to t, then

$$\sin t = y \qquad \csc t = \frac{1}{y}, y \neq 0$$

$$\cos t = x \qquad \sec t = \frac{1}{x}, x \neq 0$$

$$\tan t = \frac{y}{x}, x \neq 0 \qquad \cot t = \frac{x}{y}, y \neq 0$$

The domain of the sine function and the cosine function is $(-\infty, \infty)$, the set of all real numbers. The range of these functions is [−1, 1], the set of all real numbers from −1 to 1, inclusive.

The cosine and secant functions are **even**.

$$\cos(-t) = \cos t \qquad \sec(-t) = \sec t$$

The sine, cosecant, tangent, and cotangent functions are **odd**.

$$\sin(-t) = -\sin t \qquad \csc(-t) = -\csc t$$

$$\tan(-t) = -\tan t \qquad \cot(-t) = -\cot t$$

A function f is **periodic** if there exists a positive number p such that

$$f(t+p)=f(t)$$

for all t in the domain of f. The smallest positive number p for which f is periodic is called the **period** of f.

$$\sin(t+2\pi n)=\sin t,$$

$$\cos(t+2\pi n)=\cos t,$$

$$\text{and } \tan(t+\pi n)=\tan t.$$

$P\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$

$\sin\theta = \frac{\sqrt{3}}{2}$ $\csc\theta = \frac{2\sqrt{3}}{3}$

$\cos\theta = -\frac{1}{2}$ $\sec\theta = -2$

$\tan\theta = -\sqrt{3}$ $\cot\theta = -\frac{\sqrt{3}}{3}$

$\sin\theta$; $\cos\theta$

D: $\mathbb{R}$

R: $[-1, 1]$

$P(0, -1)$

$\sin\theta$	-1	$\csc\theta$	-1
$\cos\theta$	0	$\sec\theta$	U
$\tan\theta$	U	$\cot\theta$	0

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