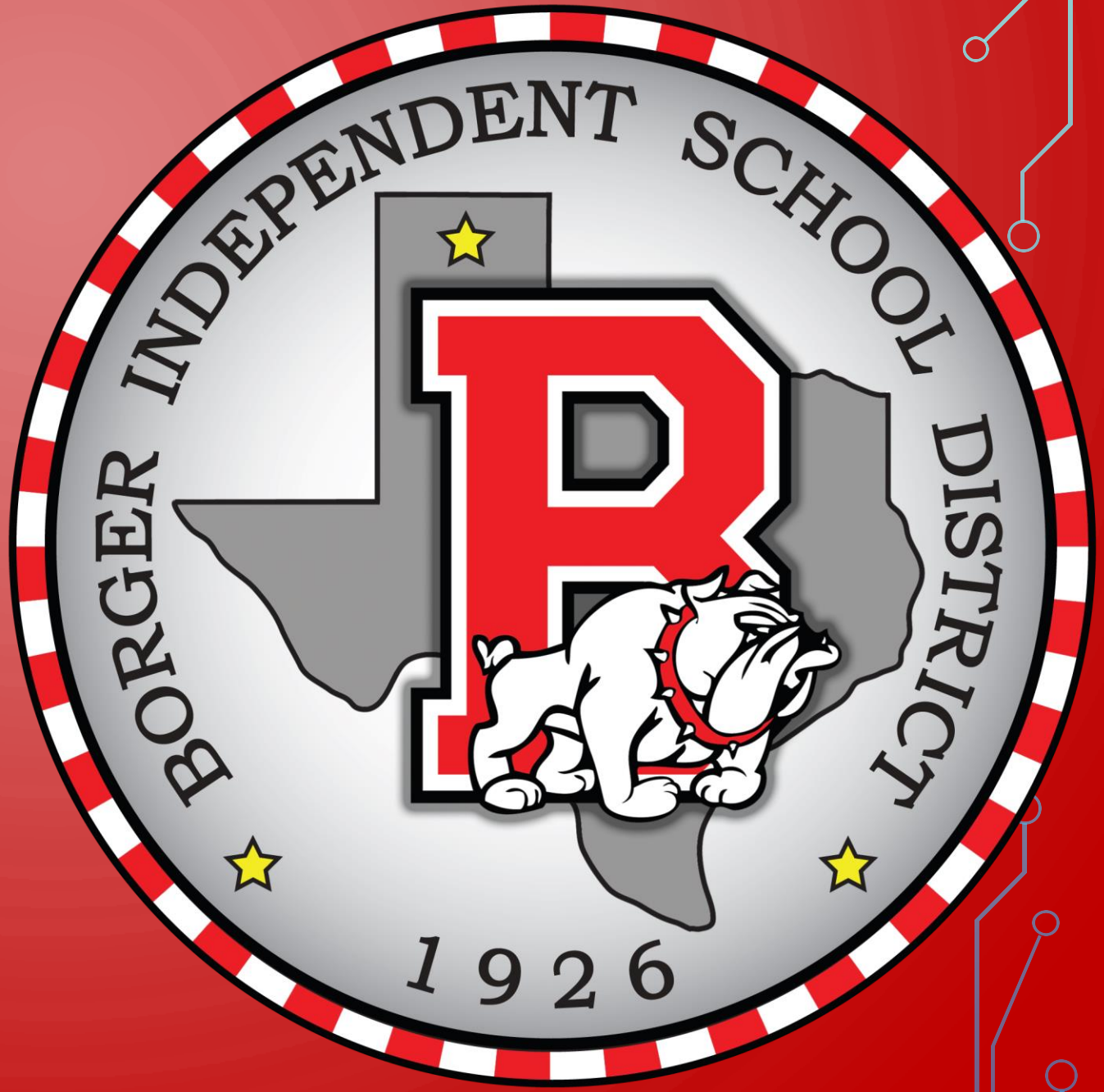
BOARD NOTES

30 JANUARY 2019



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

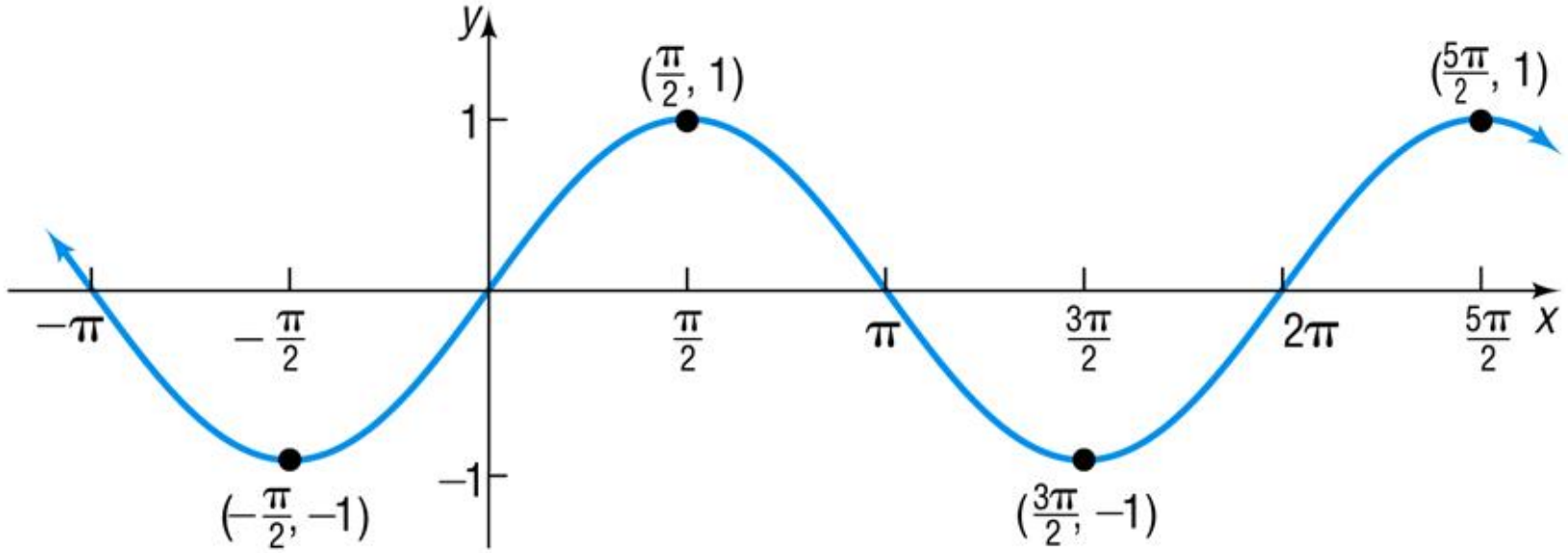
If t is a real number and $P = (x, y)$ is the point on the unit circle that corresponds to t, then

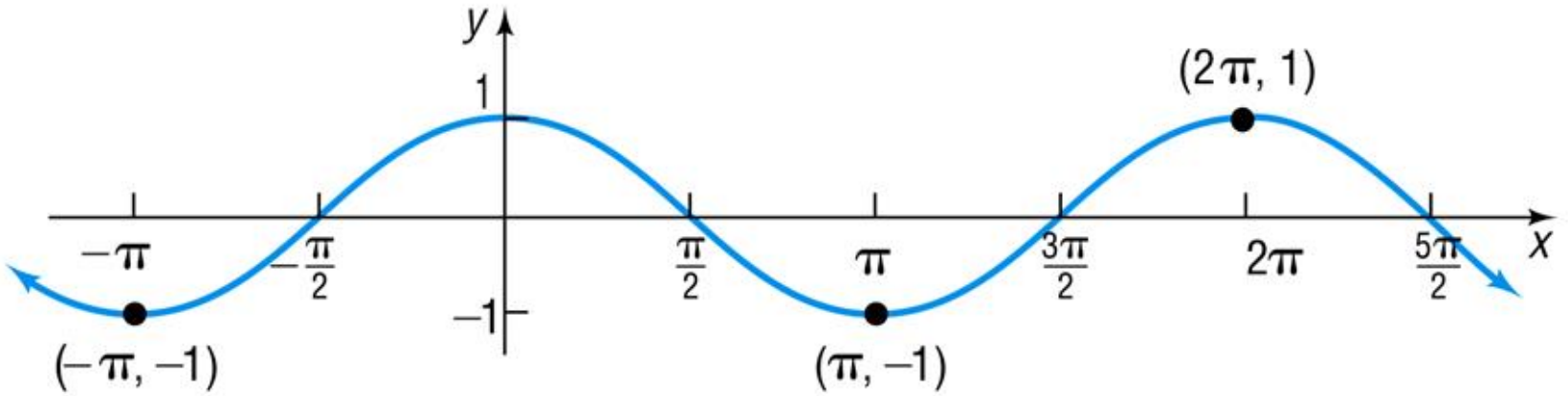
$$\sin t = y \qquad \csc t = \frac{1}{y}, y \neq 0$$

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

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

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

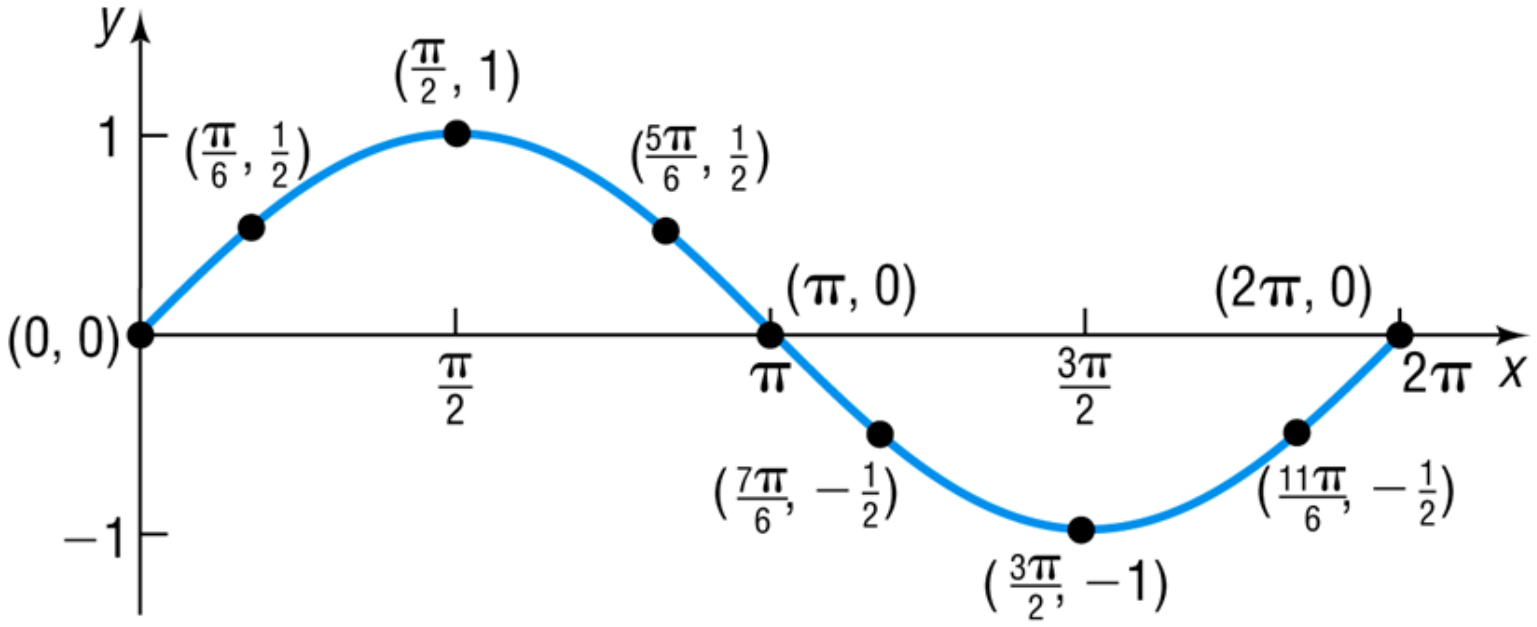
$$f(t+p)=f(t)$$

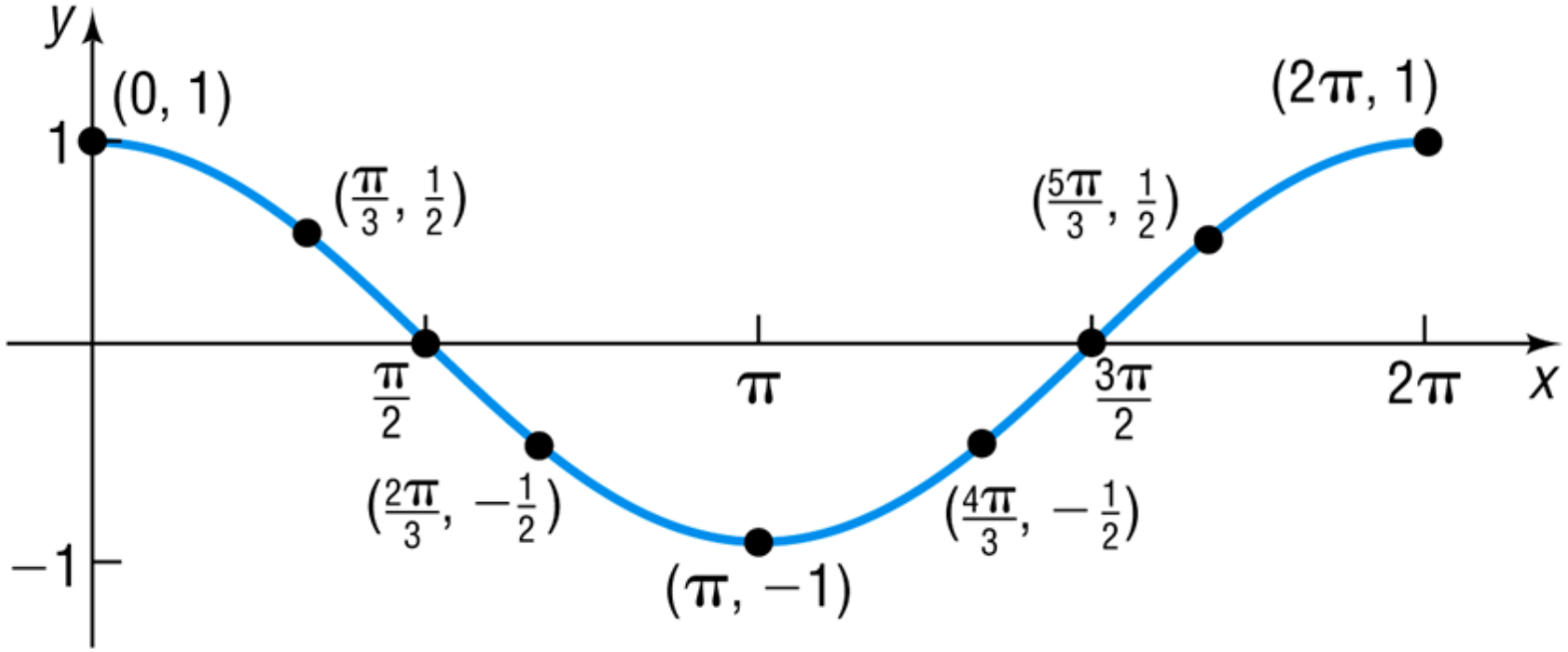
for all t in the domain of f. The smallest positive number p for which f is periodic is called the **period** of f.

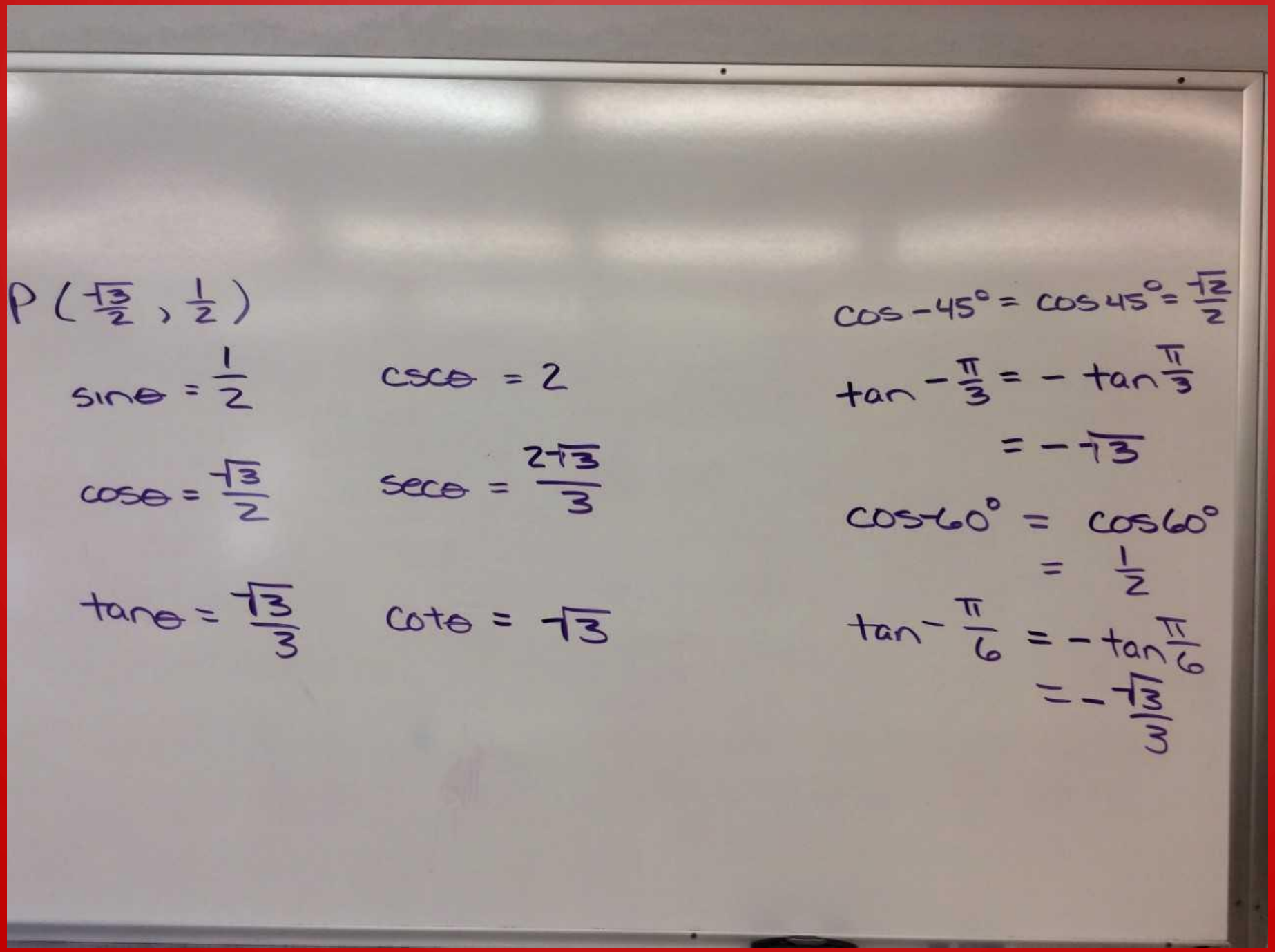
$$\sin(t+2\pi n)=\sin t,$$

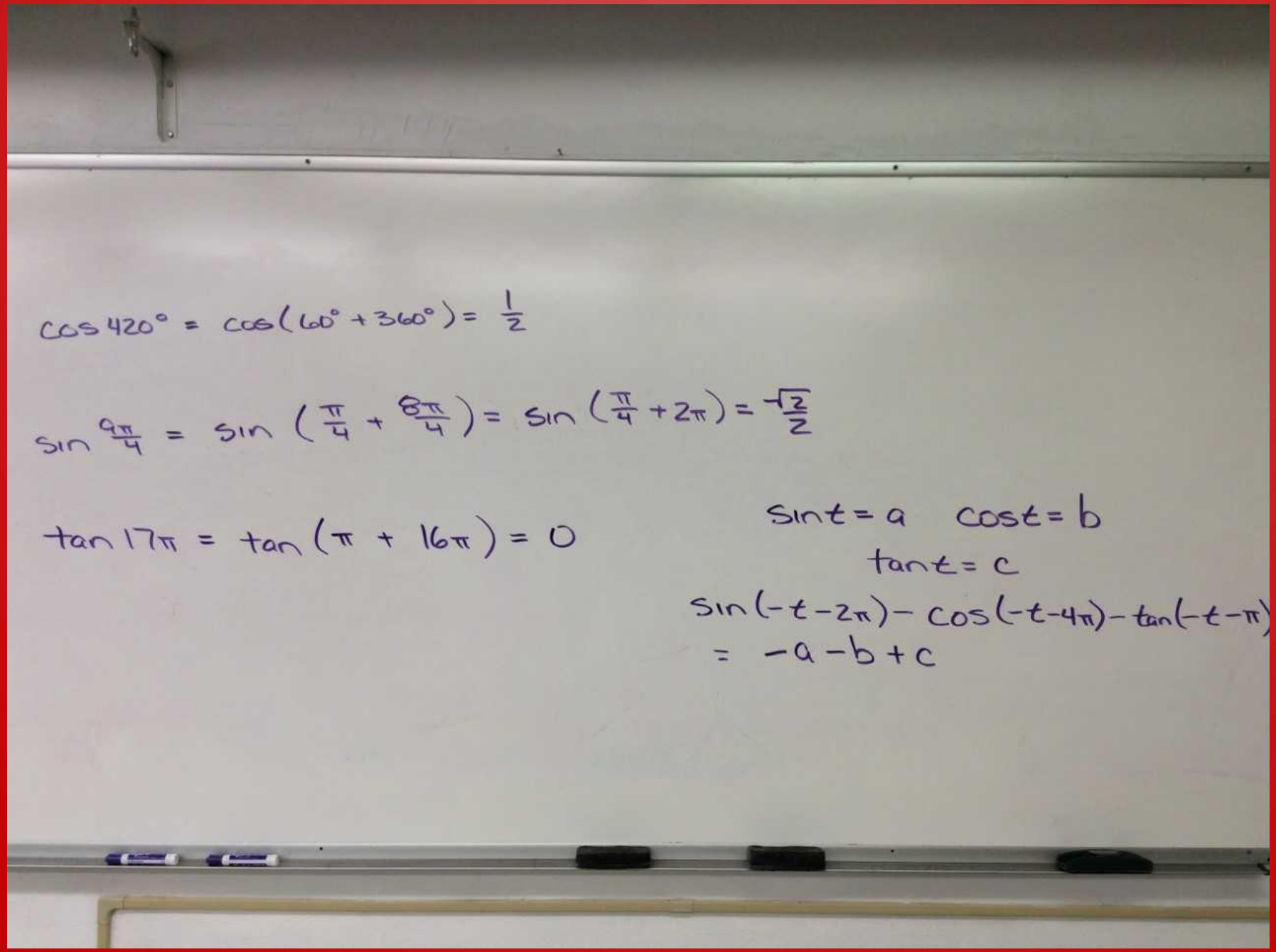
$$\cos(t+2\pi n)=\cos t,$$

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


y
1
$(\frac{\pi}{6}, \frac{1}{2})$
$(\frac{\pi}{2}, 1)$
$(\frac{5\pi}{6}, \frac{1}{2})$
(0, 0)
$\frac{\pi}{2}$
$(\pi, 0)$
π
$\frac{3\pi}{2}$
$(2\pi, 0)$
2π
x
$(\frac{7\pi}{6}, -\frac{1}{2})$
$(\frac{11\pi}{6}, -\frac{1}{2})$
$(\frac{3\pi}{2}, -1)$
−1


y
(0, 1)
1
$(\frac{\pi}{3}, \frac{1}{2})$
$(2\pi, 1)$
$(\frac{5\pi}{3}, \frac{1}{2})$
$\frac{\pi}{2}$
π
$\frac{3\pi}{2}$
2π
x
$(\frac{2\pi}{3}, -\frac{1}{2})$
$(\frac{4\pi}{3}, -\frac{1}{2})$
$(\pi, -1)$
−1


$P\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$
$\sin\theta = \frac{1}{2}$
$\csc\theta = 2$
$\cos\theta = \frac{\sqrt{3}}{2}$
$\sec\theta = \frac{2\sqrt{3}}{3}$
$\tan\theta = \frac{\sqrt{3}}{3}$
$\cot\theta = \sqrt{3}$
$\cos -45^\circ = \cos 45^\circ = \frac{\sqrt{2}}{2}$
$\tan -\frac{\pi}{3} = -\tan\frac{\pi}{3}$
$= -\sqrt{3}$
$\cos -60^\circ = \cos 60^\circ$
$= \frac{1}{2}$
$\tan -\frac{\pi}{6} = -\tan\frac{\pi}{6}$
$= -\frac{\sqrt{3}}{3}$


$\cos 420° = \cos(60° + 360°) = \frac{1}{2}$
$\sin \frac{9\pi}{4} = \sin\left(\frac{\pi}{4} + \frac{8\pi}{4}\right) = \sin\left(\frac{\pi}{4} + 2\pi\right) = \frac{\sqrt{2}}{2}$
$\tan 17\pi = \tan(\pi + 16\pi) = 0$
$\sin t = a \quad \cos t = b$
$\tan t = c$
$\sin(-t-2\pi) - \cos(-t-4\pi) - \tan(-t-\pi)$
$= -a - b + c$