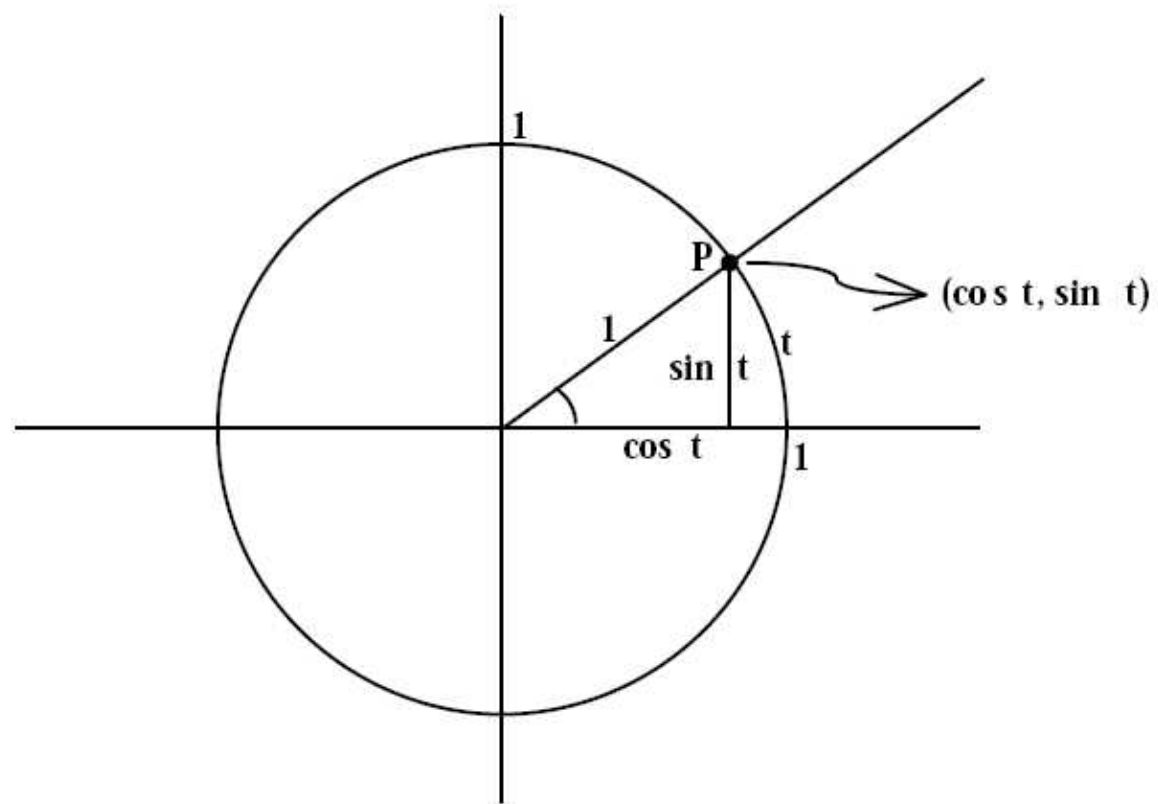


# Trigonometric Functions



**Theorem 1.** *The trigonometric functions  $\sin$  and  $\cos$  are defined for all real values of  $t$ , and are periodic with period  $2\pi$ . I.e. they satisfy  $\sin(t + n \cdot 2\pi) = \sin t$  for any real  $t$  and any integer  $n$ .*

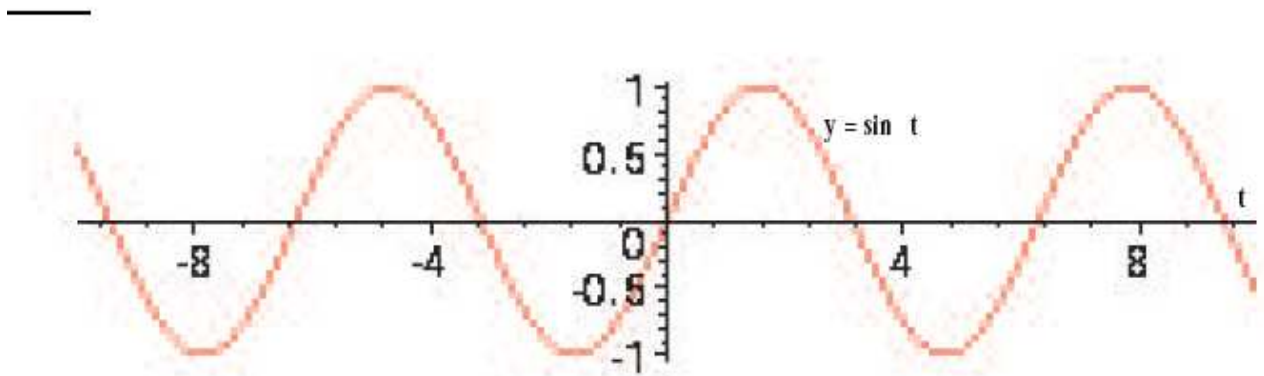
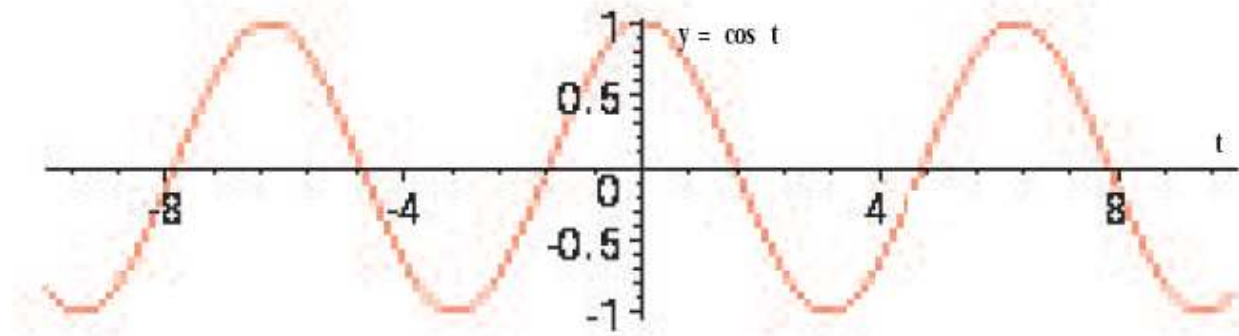
# Properties

- $\sin^2(t) + \cos^2(t) = 1.$
- $\cos(-t) = \cos(t).$
- $\sin(-t) = -\sin(t)$
- $\cos(0) = 1, \cos(\pi/2) = 0, \cos(\pi) = -1.$
- $\sin(0) = 0, \sin(\pi/2) = 1.$

## More Properties

- $\cos(\pi - t) = -\cos t.$
- $\sin(\pi - t) = \sin t.$
- $\cos(\pi/2 - t) = \sin t.$
- $\sin(\pi/2 - t) = \cos t.$

# Graphs of trigonometric functions



# Other trigonometric functions

**Definition 1.** *Other trigonometric functions:*

$$\begin{aligned}\tan t &= \frac{\sin t}{\cos t}, & \cot t &= \frac{1}{\tan t} = \frac{\cos t}{\sin t}, \\ \sec t &= \frac{1}{\cos t}, & \csc t &= \frac{1}{\sin t}.\end{aligned}$$

# Graph of $\tan t$

