

# Graphing Sine and Cosine

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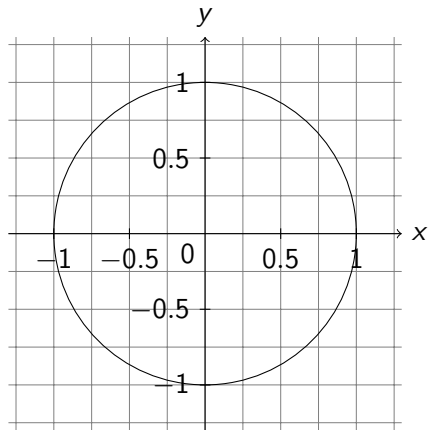
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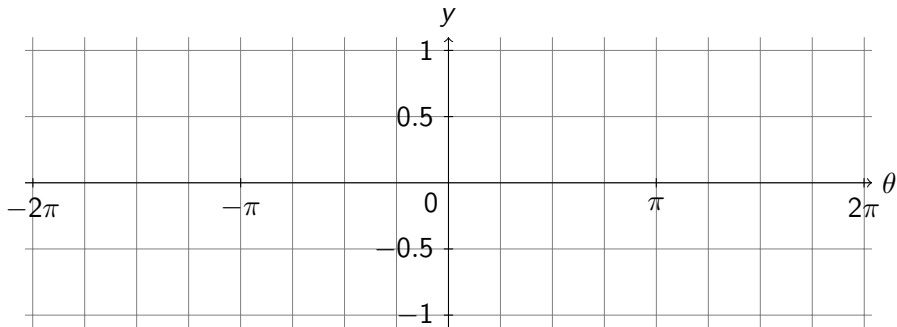
# Announcements

- 1 Homework and Project in MyOpenMath.
- 2 Office hours, 10am - 11am.

# Graphing $\sin(\theta)$ and $\cos(\theta)$



# Graphing $\sin(\theta)$ and $\cos(\theta)$



# The Period of $\sin(\theta)$ and $\cos(\theta)$

We've already discussed the period of  $\sin(\theta)$  and  $\cos(\theta)$ , but let's see if we can determine these from the graphs we just drew.

# Special Characteristics of Sine and Cosine functions

The following are special characteristics we can determine from the graphs of  $\sin(\theta)$  and  $\cos(\theta)$ :

- 1 The domain of both functions is: \_\_\_\_\_.
- 2 The range of both functions is: \_\_\_\_\_.
- 3 Both functions are periodic with period: \_\_\_\_\_.
- 4  $\sin(\theta)$  is \_\_\_\_\_, in other words, the graph of  $y = \sin(\theta)$  is symmetric about the origin.
- 5  $\cos(\theta)$  is \_\_\_\_\_, in other words, the graph of  $y = \cos(\theta)$  is symmetric about the y-axis.

# Investigating General Sinusoidal Functions

In general, we call any periodic function that oscillates between a maximum value and a minimum value \_\_\_\_\_. Sinusoidal functions in general can be written as:

$$y =$$

or

$$y =$$

Let's investigate how all of these numbers affect the shape of the graph of sin and cos.

A (With C and D both 0)



# Amplitude

$B$  (With  $C$  and  $D$  both 0)





# The Phase Shift



# The Midline

# Putting it all together

So to graph a sinusoidal function  $y = A \sin(Bx - C) + D$  or  $y = A \cos(Bx - C) + D$ :

- 1 Determine the Amplitude:  $|A|$
- 2 Determine the Period:  $\frac{2\pi}{|B|}$
- 3 Determine the Phase Shift:  $\frac{C}{B}$
- 4 Determine the midline:  $y = D$



# A Modeling Problem

Model the number of hours of daylight in Winchester, VA  $t$  days after January 1 using a sinusoidal function.