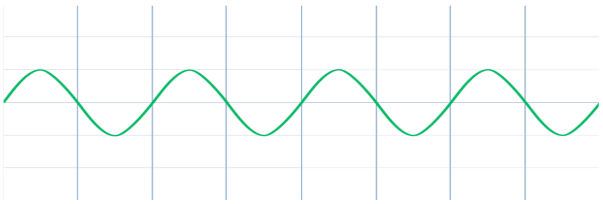
The Derivatives of $y = \sin x$ and $y = \cos x$



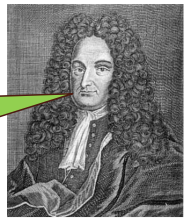
The Derivatives…

If $y = \sin x$, then $y' = \cos x$.

If $y = \cos x$, then $y' = -\sin x$.

or in Liebniz notation…

$$\frac{d}{dx}\sin x = \cos x \qquad \frac{d}{dx}\cos x = -\sin x$$



Some examples…

On a separate page, differentiate each of the following functions.

1) $y = \sin 8x$

2) $y = x\cos x$

3) $y = \sin x^2$

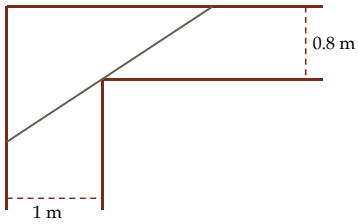
4) $y = \sin^2 x$

5) $y = \cos\left(1 + x^3\right)$

6) $y = e^{\sin x + \cos x}$

Applying the derivative of a trigonometric function…

A thin rigid pole needs to be carried horizontally around a corner joining two corridors, which are 1 m and 0.8 m wide. Calculate the length of the longest pole that can be carried around this corner.



When the derivative is not needed…

Note that finding maximum and minimum values for trigonometric functions can often be done easily without the derivative.

For example, state the absolute maximum and minimum values for the following functions.

$y = 3\cos(2x) + 5$

Absolute Max Value = 8
Absolute Min Value = 2

$y = -4\sin^2 x - 7$

Absolute Max Value = -7
Absolute Min Value = -11

Question for Discussion

Up to this point, we have been using only radian measure. If $y = \sin x$, where x is measured in **degrees**, is it still true that $y' = \cos x$?

NO!

This idea is one of the major reasons why mathematicians prefer radian measure over degree measure and why radian measure is always used in calculus.