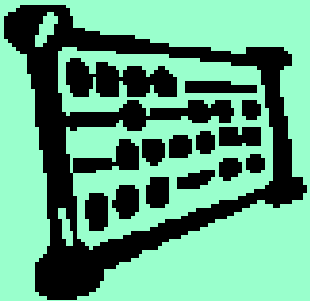


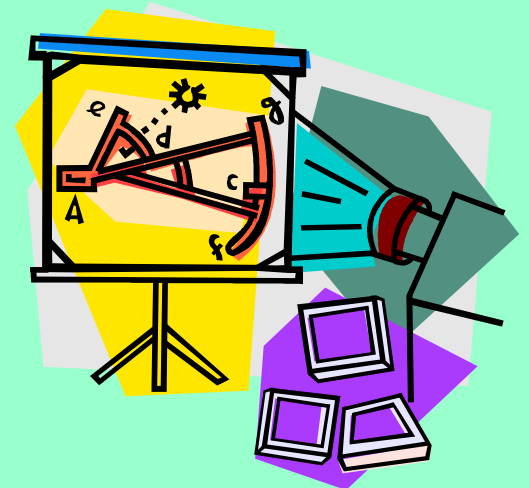
1.

# Differentiating Trig Functions

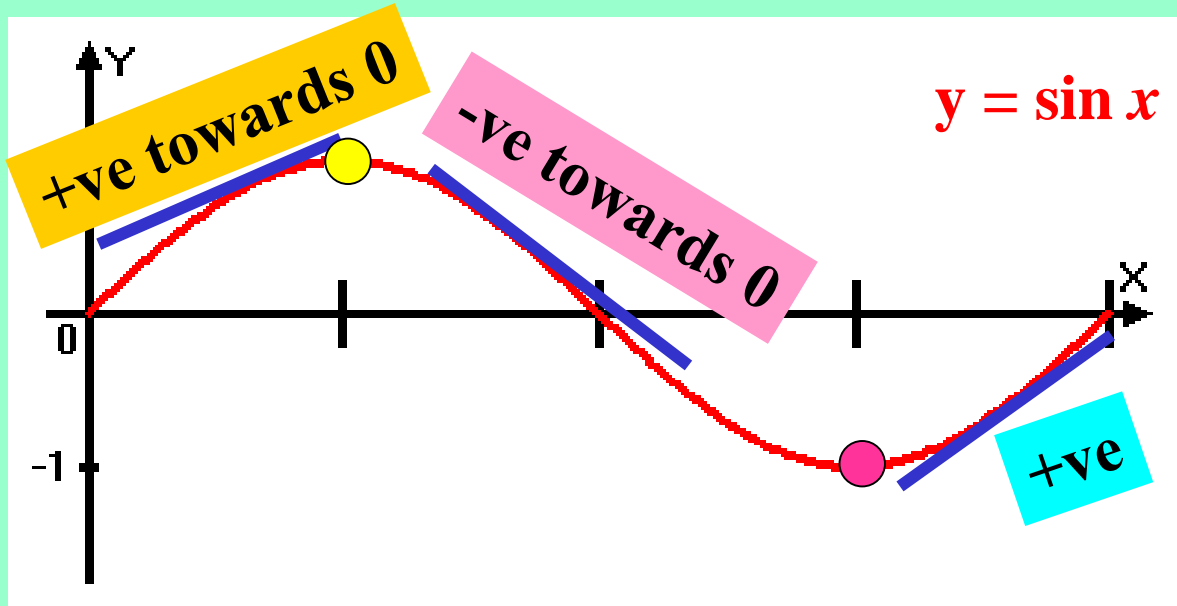


$$\frac{d}{dx}(\sin x) = \cos x$$

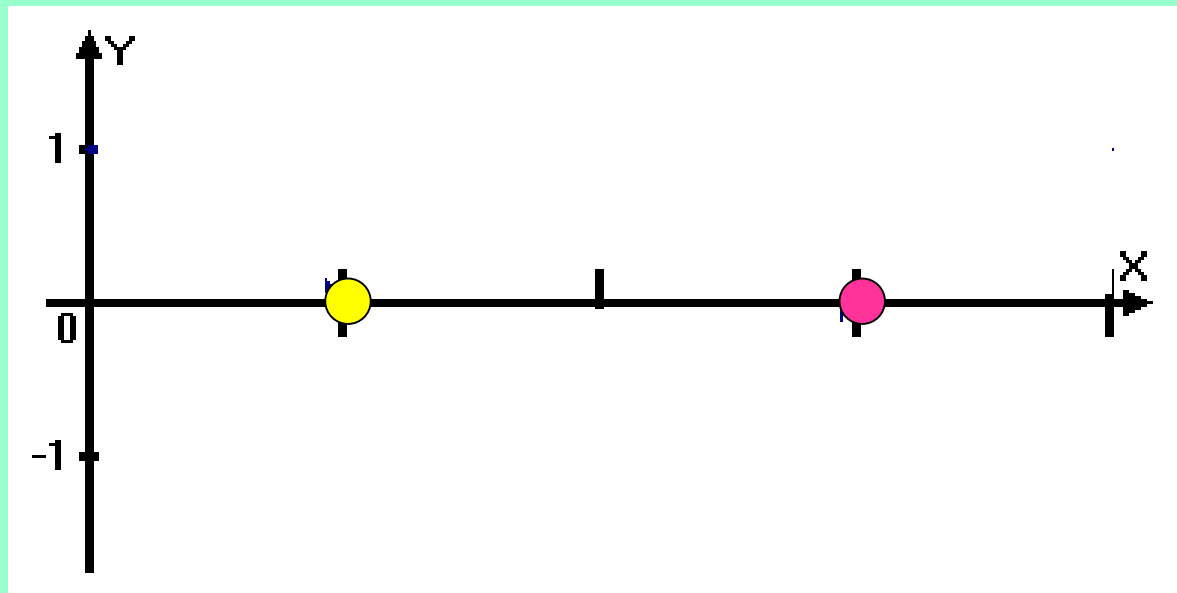
$$\frac{d}{dx}(\cos x) = -\sin x$$



# Graph of the derivative of $\sin x$

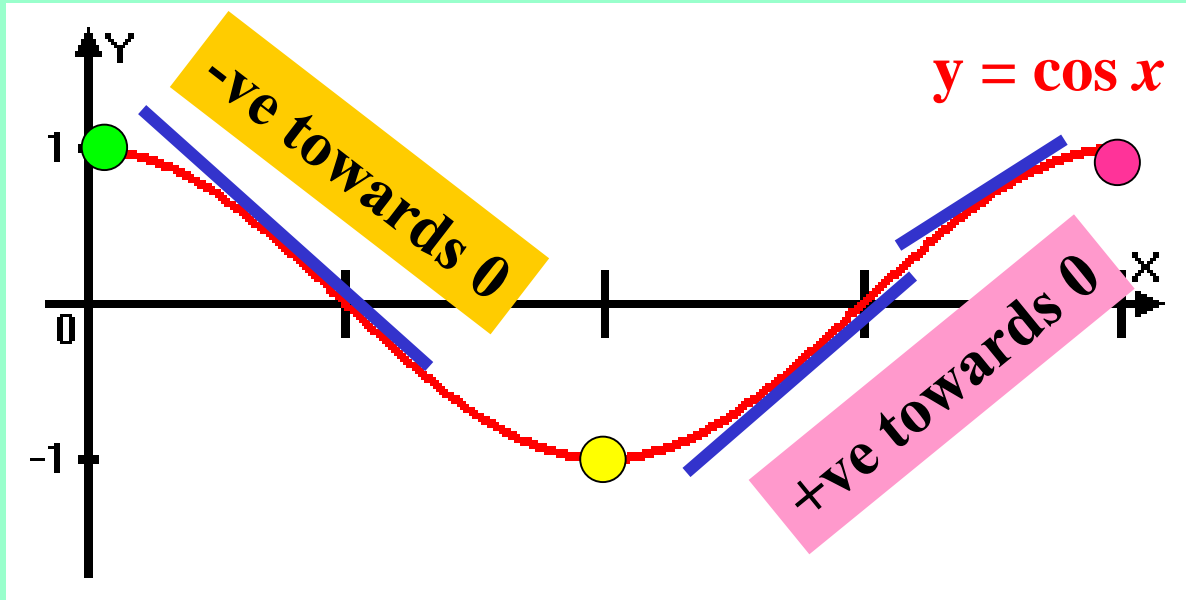


$$\frac{d}{dx}(\sin x) = \cos x$$

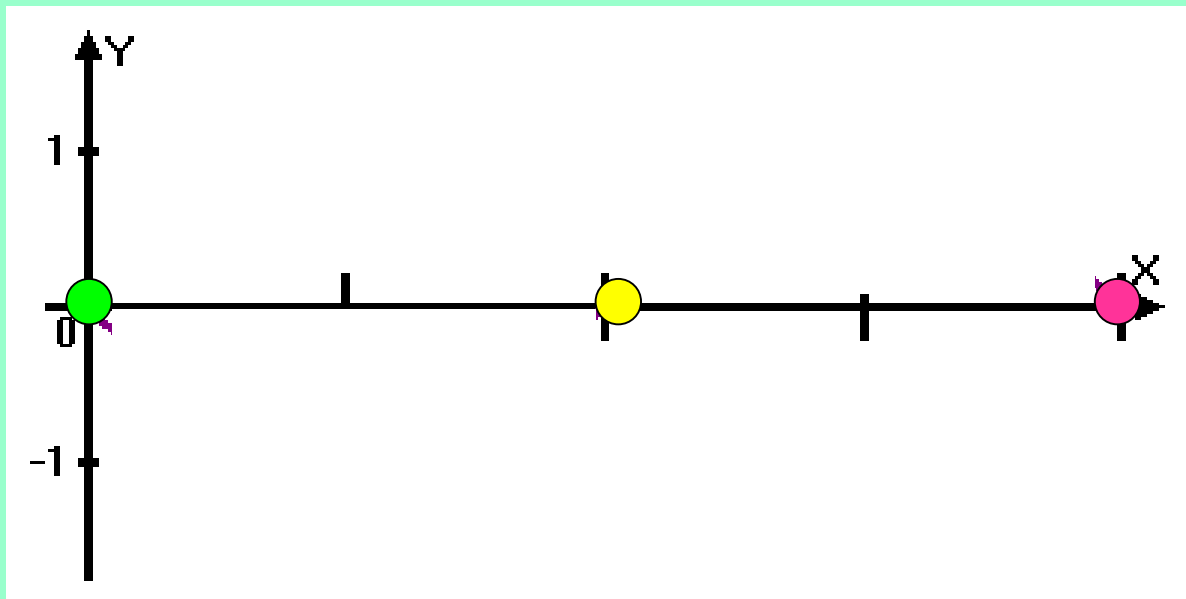


$$y = \cos x$$

# Graph of the derivative of $\cos x$



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



Upside down  
graph of  $\sin x$

## Example 1

Find  $f'(x)$  when:

(a)  $f(x) = 3\sin x$

**NAB**

(b)  $f(x) = 10\cos x + 2x^5$

**Solution:**

(a)  $f(x) = 3\sin x$

$f(x) = 3 \times \sin x$

$f'(x) = 3 \times \cos x$

$f'(x) = 3\cos x$

Only  
differentiat  
e functions  
of x

Sin =  
“same  
sign”

(b)  $f(x) = 10\cos x + 2x^5$

$f(x) = 10 \times \cos x + 2x^5$

$f'(x) = 10 \times -\sin x + 5 \times 2x^{5-1}$

$f'(x) = -10\sin x + 10x^4$

Heinemann, p.264, EX 14B, Q1(a) to (h)

This is not the end

## Example 2

Find the equation of the tangent to  $y = \cos x$  at the point where  $x = \frac{\pi}{6}$

**Solution:**

Tangent is straight line so need **m** and **point (a,b)**

For gradient:

$$y = \cos x \Rightarrow \frac{dy}{dx} = -\sin x$$

$$\frac{dy}{d\left(\frac{\pi}{6}\right)} = -\sin\left(\frac{\pi}{6}\right)$$

$$\frac{dy}{d\left(\frac{\pi}{6}\right)} = -1 \times \sin\left(30^\circ\right) = \boxed{-\frac{1}{2}}$$

For point:

$$y = \cos x \Rightarrow y\left(\frac{\pi}{6}\right) = \cos\left(\frac{\pi}{6}\right)$$

$$= \frac{\sqrt{3}}{2} \longrightarrow \boxed{\left(\frac{\pi}{6}, \frac{\sqrt{3}}{2}\right)}$$

Solution (continued):

$$\left( \frac{\pi}{6}, \frac{\sqrt{3}}{2} \right)$$

Equation of tangent:

$$y - y_1 = m(x - x_1)$$

$$y - \frac{\sqrt{3}}{2} = -\frac{1}{2} \left( x - \frac{\pi}{6} \right)$$

X 2

$$2y - \sqrt{3} = -1 \left( x - \frac{\pi}{6} \right)$$

Heinemann, p.264, EX 14B, Q5