

## 5.4 – Derivatives of $\sin x$ and $\cos x$

### *Derivatives of Sinusoidal Functions*

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

**Example 1:** Determine the derivative for each function.

a)  $y = \cos 3x$

b)  $y = x \sin x$

c)  $y = \sin x^2$

d)  $y = \sin^2 x$

### *Derivatives of Composite Sinusoidal Functions*

If  $y = \sin f(x)$ , then  $\frac{dy}{dx} = \cos f(x) \times f'(x)$

If  $y = \cos f(x)$  then  $\frac{dy}{dx} = -\sin f(x) \times f'(x)$

**Example 2:** Determine the derivative for  $y = \cos(1 + x^3)$

**Example 3:** Determine  $y'$  for  $y = e^{\sin x + \cos x}$

**Example 4:** Determine the equation of the tangent to the graph of  $y = x\cos 2x$  at  $x = \pi/2$ .

**Example 5:** Determine the max and min values of the function  $f(x) = \cos^2 x$  on the interval  $[0, 2\pi]$