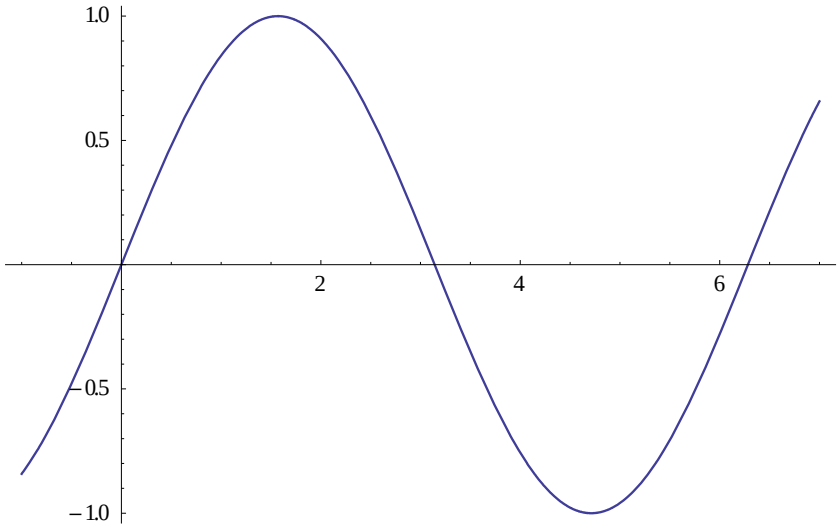
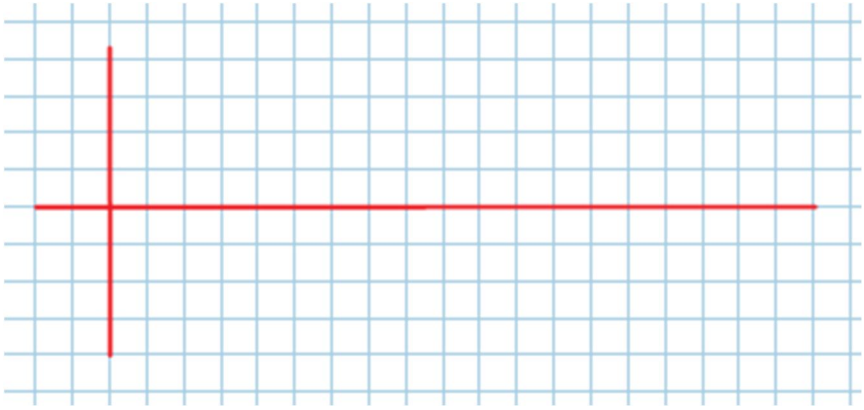
# 5.4 The Derivatives of Sine and Cosine

We begin with a "geometric analysis" of the function $f(x)=\sin(x)$, considering its derivative (geometrically) at various domain values.

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




$f'(x)=?$



**Definition 5.4.1**

Given $f(x)=\sin(x)$

Then $\frac{df}{dx}=f'(x)=$

Given $g(x)=\cos(x)$

Then $\frac{dg}{dx}=g'(x)=$

**Example 5.4.1**

Determine the derivative of

a) $y=\sin\left(3x^2-5x\right)$

b) $f(x)=e^{\sin(x)+\cos(x)}$

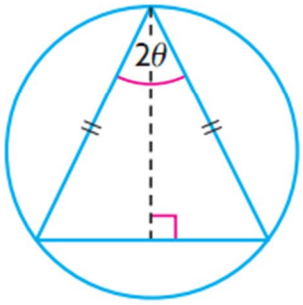
c) $g(x)=\sin^3(4x)$

d) $y=\frac{\cos(4x)}{e^{\sin(x)}}$

**Example 5.4.2**

From your text: Pg. 257 #13

An isosceles triangle is inscribed in a circle of radius **R**. Find the value of $\theta$ that maximizes the area of the triangle.




*Class/Homework for Section 5.4*

*Pg. 256 – 257 #1ace, 2bcde, 3bcf, 5, 6ac, 7, 9, 12*