Some Trigonometric Derivatives

Please graph the following on $[-2\pi, 2\pi]$:

$y_1 = \sin x$

$y_2 = nDeriv(y_1, x, x)$

For newer TI's use $nDeriv\frac{d}{dx}(y_1)|_{x=x}$

Guess [based on the graph]

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

Now let $y_1 = \cos x$ and use the same y_2

Guess [based on the graph]

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

These derivatives can be found using the limit definition of derivative and can be found on page 112.

The same basic differentiation rules apply. [Yay! We don't have to learn new ones!]

Now let's find some more derivatives:

$f(x)$	$f'(x)$
$7\sin x$	$7\cos x$
$11\cos x$	$-11\sin x$
$5\sin x - 6\cos x$	$5\cos x + 6\sin x$

Horizontal tangents will occur when the derivative is equal to zero.

Example:

Find where the function $f(x) = 3x^2 + 6x$ has a horizontal tangent.

$f'(x) = 6x + 6$

$0 = 6x + 6$

$x = -1$

$f'(-1) = 0$

Another example:

Show that the graph of the function $f(x) = 2x + \sin x + 2$ does not have any horizontal tangents.

$f'(x) = 2 + \cos x$

$0 = 2 + \cos x$

$-2 = \cos x$

Now let's work on Handout #1

$f(x) = 3x^{-2}$

$f'(x) = -6x^{-3}$ (1, 3)

$f'(1) = -6$

$y - 3 = -6(x - 1)$

TI

nDeriv $f'(1) = -6.00012$