From Chapter 3:

3.4 Derivatives with a Grapher

Since $f'(t)$ can be approximated by the difference quotient

$$f'(t) \approx \frac{f(t+\Delta t) - f(t)}{\Delta t}$$

at every value of t, we can use a grapher (a computer or graphing calculator) to draw a close approximation to the derivative function f'. We simply enter f in the grapher as one function, and then enter

$$g(t) = \frac{f(t+.0001) - f(t)}{.0001}$$

as another function. Then $g(t) = \frac{\Delta f}{\Delta t}$ with $\Delta t = .0001$. That makes $g(t)$ pretty close to $f'(t)$ for most functions f. The resulting picture of f and g together gives a good idea of what f and its derivative f' look like together.

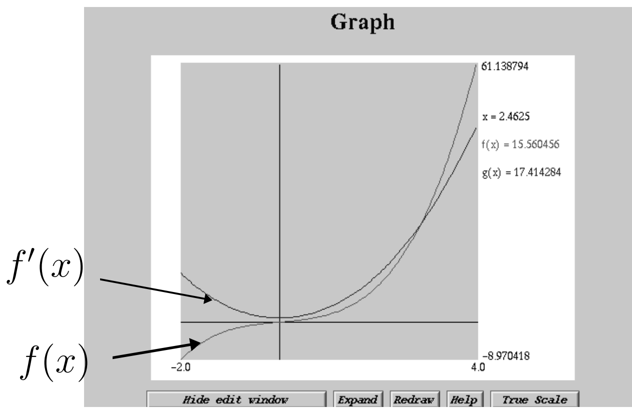
If your grapher can't do this, use ours at
www.math.smith.edu/~cohenle/graph/graph.html.

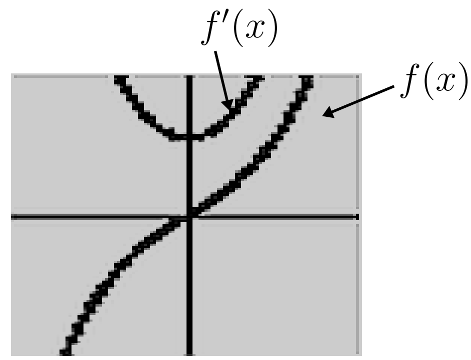
Example: Sketch the derivative graph for the function $f(x) = x^3 + \sin(x)$ on a grapher.

Solution. Put the equation $f(x) = x^3 + \sin(x)$ into the grapher. (Don't forget to put the grapher into radian mode, if applicable.) Then put a second function into the grapher: $g(x) = \frac{f(x+.0001)-f(x)}{.0001}$. Often you'll have to enter the second function with lots of parentheses:

g(x)=(f(x+.0001)-f(x))/.0001

Your grapher should plot both f and g on the same set of axes, thus showing the function and a good approximation of its derivative. Here is a screen from *Graph* and one from a graphing calculator.





Notice that the pictures are different. What you get depends on the scaling and intervals you choose.