10. (8 points) Let $f(x) = \ln(\sin x)$. Use your calculator and the **limit definition** of the derivative to approximate the instantaneous rate of change of f at x = 1. In order to receive full credit, you must show your work and indicate the values that you use to come up with your approximation. (Note: be sure that your calculator is set to radian mode.)

$$f'(1) = \lim_{h \to 0} \frac{f(1+h) - f(1)}{h}$$

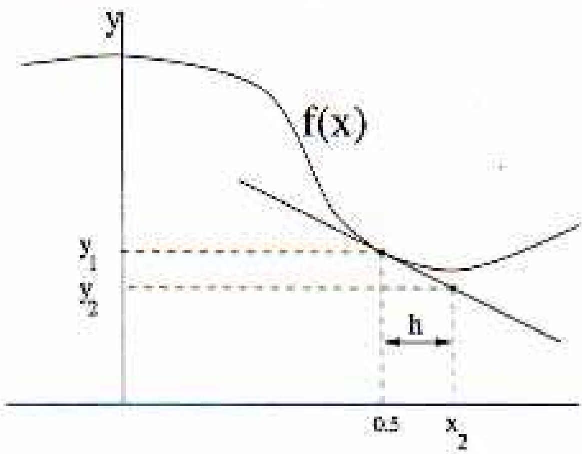
$$= \lim_{h \to 0} \frac{\ln(\sin(1+h)) - \ln(\sin 1)}{h} \quad (*)$$

taking small values of h, we have

h	$(*)$
.01	.63506
.001	.64139
.0001	.64203
−.0001	.64202
−.001	⋮
−.01	⋮

$\rightarrow f'(1) \approx .642$

11. (8 points) In the figure below, it is given that $f(0.5) = 3$, $f'(0.5) = -2$, and $h = 0.1$. Determine the values of y_1, y_2, and x_2.



(or can find eqn of tangent to get x_2 & y_2)

Given: $f(0.5) = 3 \rightarrow y_1 = 3$

Given $f'(0.5) = -2$ & $h = 0.1$

$\rightarrow \frac{\Delta y}{\Delta x} = \frac{\Delta y}{.1} = -2$

$\Delta y = -.2$

$x_2 = 0.5 + 0.1 = 0.6$

$y_2 = y_1 - .2 = 3 - .2 = 2.8$

$y_1 =$ 3

$y_2 =$ 2.8

$x_2 =$ 0.6