

Reset
De Faults
Znd
MATH
+

SLOPE & TI-83 : EXAMPLE

$$m(x) \approx \frac{f(x+h) - f(x-h)}{(x+h) - (x-h)}$$

* SYMMETRIC DIFFERENCE QUOTIENT:

ESTIMATE SLOPE OF TANGENT LINE TO $f(x) = \sqrt{x+1}$ AT $x=3$

For $h = 0.2 = \Delta x/2$
Using $x = [3-0.2, 3+0.2]$
[2.8, 3.2]

$$m(3) \approx \frac{y_1(3.2) - y_1(2.8)}{3.2 - 2.8} = \frac{0.1000313}{0.4} \approx 0.2500782106$$

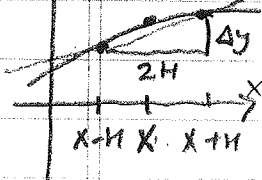
Graph
Zoom 6: 2 standard.

6 [Znd] TRACE 6: dy/dx 3 [Enter] = 0.25.

[MATH] 8:

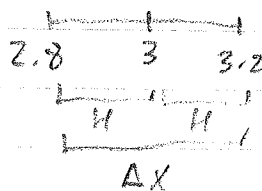
[Y=] $y_1 = \sqrt{x+1}$
[2nd] [Y-VARS] 1: Y1

n Deriv ($y_1, x, 3, 0.2$) = 0.2500782106



$$\frac{\Delta y}{\Delta x} = \frac{y(3+0.2) - y(3-0.2)}{(3+0.2) - (3-0.2)} = \frac{y(3+0.2) - y(3-0.2)}{2(0.2)}$$

Symmetric about $x=3$.



$$= \frac{y(3+0.2) - y(3-0.2)}{0.4} \approx 0.2500782106$$

Now try $h = 0.01, \Delta x = 0.02$ (10 decimal) GRAPH $H=X$

$$m(3) \approx 0.2500001953$$

$h = 0.001$

NO H:

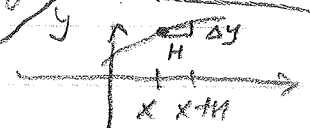
GRAPH m vs. H

$$y_1 = \frac{\sqrt{3+1+H} - \sqrt{3+1-H}}{2H}$$

[ZOOM] 4 ZDEGREE [Znd] [Zoom Format] TRACE

$$n Deriv ($y_1, x, 3$) = 0.2500000020$$

* ONE-SIDED DIFF. QUOTIENT $m(x) \approx \frac{f(x+h) - f(x)}{(x+h) - x}$



EXERCISE
SLOPE OF
 $f(x) = \sqrt{x}$
AT
 $x = 4, 9, 16, 20$

RIGHT = $R = m_R(3) \approx \frac{y_1(3.2) - y_1(3.0)}{3.2 - 3.0} = 0.2469507680$

LEFT = $L = m_L(3) \approx \frac{y_1(3.0) - y_1(2.8)}{3.0 - 2.8} = 0.2532056552$

AVERAGE = $\bar{m}(3) \approx \left(\frac{R+L}{2}\right) = 0.2500782106$