

HW#2 Due Jan 20, 2022

HW Given  $y = 10 + \sqrt{x}$ ,

- a) Find the derivative  $f'(x)$ .  
 b) Fill in the table

Point	X	Y	$f'(x)$
	0	10	undefined
A	1	11	$\frac{1}{2}$
B	2	11.414	$\frac{1}{2\sqrt{2}}$
C	3	11.732	$\frac{1}{2\sqrt{3}}$

} b)

a)  $f(x) = 10 + \sqrt{x}$

$f'(x) = \frac{1}{2\sqrt{x}}$

- c) Does the slope increase as  $x$  increases?  
 d) Approximate the change in  $Y$  when  $\Delta x = 0.2$  at  $x_1 = 3$ . Is the approximation under- or over-estimate?

c) no the slopes are decreasing when  $x$  increases.

d) find  $\Delta Y$

when  $x_1 = 3$      $y_1 = 11.732$      $\Delta x = .2$

slope =  $\frac{\Delta Y}{\Delta x}$

$\Delta Y = (\text{slope}) (\Delta x)$

$\Delta Y = \left(\frac{1}{2\sqrt{3}}\right) (.2)$

$\Delta Y = \frac{\sqrt{3}}{30} \approx 0.057735$   
 $\approx 0.0577$

find real  $\Delta Y$

when  $x_1 = 3$      $\Delta x = .2$      $y_1 = 11.732$

$x_2 = 3.2$

$y_2 = f(3.2) = 10 + \sqrt{3.2}$   
 $= 11.78895$

real  $\Delta Y = y_2 - y_1$

$= 11.78885 - 11.732$

$\approx 0.056854$

$\approx 0.0569$

$\therefore$  the approximation is overestimated.