

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

a) Find the derivative $f'(x)$.

b) Fill in the table

Point	X	Y	$f'(x)$
	0	10	
A	1	11	
B	2	11.414	
C	3	11.732	

c) Does the slope increase as x increase?

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

a) $f'(x) = \frac{dy}{dx} = \frac{d}{dx} (10 + \sqrt{x}) = \frac{1}{2\sqrt{x}} \quad \#$

b)

Point	X	Y	$f'(x)$
	0	10	-
A	1	11	0.5 = $f'(1)$
B	2	11.414	0.35 = $f'(2)$
C	3	11.732	0.28 = $f'(3)$

#

c) As shown in the table in b), the slope ($f'(x)$) decreases as x increases. #

d) When $x_1 = 3$, $f(x_1) = 10 + \sqrt{3} = 11.732$

Approximate Change

$$\Rightarrow \frac{dy}{dx} = f'(x) = \frac{\Delta y}{\Delta x}$$

$$\Delta y = f'(x) \Delta x$$

at $x = x_1 = 3$, and $\Delta x = 0.2$

$$\Delta y_{\text{approx.}} = \frac{1}{2\sqrt{3}} (0.2) = 0.0577$$

Actual Change

$$\Rightarrow \Delta y = f(3.2) - f(3)$$

$$\Delta y = 11.788 - 11.732$$

$$\Delta y_{\text{actual}} = 0.0568$$

$\therefore$ The approximate change overestimates the actual change. #