

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	
A	1	11	0.5
B	2	11.414	0.3536
C	3	11.732	0.2887

- 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?

$$\begin{aligned} \text{a) } f(x) &= 10 + \sqrt{x} \\ &= 10 + x^{\frac{1}{2}} \\ f'(x) &= \frac{1}{2} x^{-\frac{1}{2}} \\ &= \frac{1}{2\sqrt{x}} \end{aligned}$$

c. No, it does not.

$$\begin{aligned} \text{d. } \Delta y &\approx f'(x_1) \cdot \Delta x \\ &= f'(3) \cdot 0.2 \\ &= 0.2887 \times 0.2 \\ &= 0.05774 \end{aligned}$$

\therefore overestimate

real Δy

$$\begin{aligned} y_2 &= f(3.2) \\ &= 10 + \sqrt{3.2} \\ &= 11.7889 \end{aligned}$$

$$\begin{aligned} \Delta y &= y_2 - y_1 \\ &= 11.7889 - 11.732 \\ &= 0.0565 \end{aligned}$$