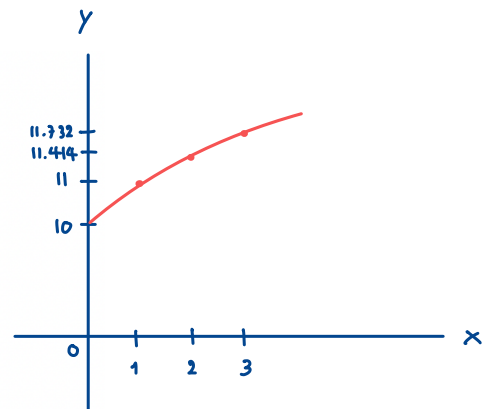


HW#2 Due Jan 20, 2022

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

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

Point	X	Y	$f'(x)$
	0	10	—
A	1	11	0.5
B	2	11.414	0.35
C	3	11.732	0.29



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

① derivative $y = 10 + \sqrt{x}$

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

③ No, the slope decrease as x increase

④ Estimate Δy

$$\begin{aligned}
 \Delta x &= 0.2 \text{ at } x_1 = 3 \\
 \Delta y &\approx f'(x_1) \cdot \Delta x \\
 &= f'(3) \cdot \Delta x \\
 &= \frac{1}{2\sqrt{3}} \cdot 0.2 \\
 &= \frac{1}{2\sqrt{3}} \cdot 0.2 \\
 &= 0.058
 \end{aligned}$$

$x_1 = 3$
 $y_1 = 11.732$
 $\Delta x = 0.2$
 $x_2 = 3.2$

real $\Delta y = ?$

$$\begin{aligned}
 y_2 &= f(x_2) = 10 + \sqrt{3.2} \\
 &= 11.789
 \end{aligned}$$

$$\begin{aligned}
 \Delta y &= y_2 - y_1 \\
 &= 11.789 - 11.732 \\
 &= 0.057
 \end{aligned}$$

$\therefore$ We overestimate the real change of y