

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	$\frac{1}{2} = 0.5$
B	2	11.414	$\frac{1}{2\sqrt{2}} = 0.35$
C	3	11.732	$\frac{1}{2\sqrt{3}} = 0.29$

$$f(x) = 10 + x^{\frac{1}{2}}$$

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

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

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

C) No, the slope decreases as  $x$  increase.

$$\begin{aligned} d) \Delta y &\approx f'(x_1) \cdot \Delta x \\ &\approx f'(3) \cdot \Delta x \\ &= \frac{1}{2\sqrt{3}} \cdot 0.2 = 0.0577 \end{aligned}$$

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

$$\text{real } \Delta y = y_2 - y_1 = 11.7889 - 11.732 = 0.05689$$

$\therefore$  The approximation is over-estimate.