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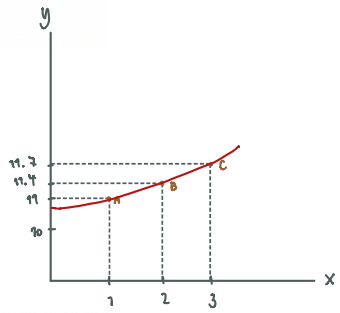
HW Given $y = 10 + \sqrt{x}$,

a) Find the derivative $f'(x)$. $f'(x) = \frac{\sqrt{x}}{2x}$

b) Fill in the table

Point	X	Y	$f'(x)$
	0	10	0
A	1	11	0.5
B	2	11.414	$\frac{\sqrt{2}}{4} = 0.353$
C	3	11.732	$\frac{\sqrt{3}}{6} = 0.288$



c) Does the slope increase as x increase? No

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

a) Given $y = 10 + \sqrt{x}$

$\Downarrow$

$y = 10 + x^{\frac{1}{2}}$

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

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

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

$= \frac{1}{2x^{\frac{1}{2}}}$

$= \frac{1}{2\sqrt{x}} \cdot \frac{\sqrt{x}}{\sqrt{x}}$

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

d) • When $x_1 = 3$, $y_1 = 11.732$

At C (3, 11.732)

If $\Delta x = 0.2$ we can approximate

$\Delta y \approx f'(x_1) \cdot \Delta x$

$= f'(3) \cdot 0.2$

$= \frac{\sqrt{3}}{6} \cdot 0.2$

$= 0.29 \cdot 0.2 = 0.0576$

• Real Δy

$y_2 = f(3.2) = 10 + \sqrt{3.2} = 11.788$

$\Delta y = y_2 - y_1 = 11.788 - 11.732 = 0.056$

∴ The approximate is overestimate.