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only positive part

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

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

b) Fill in the table

$10+\sqrt{x} \hookrightarrow x^{\frac{1}{2}} \hookrightarrow (\frac{1}{2})(x)^{\frac{1}{2}-1} \hookrightarrow \frac{1}{2}x^{-\frac{1}{2}} \hookrightarrow \frac{1}{2}(\frac{1}{x^{\frac{1}{2}}}) \hookrightarrow \frac{1}{2\sqrt{x}} \hookrightarrow \frac{\sqrt{x}}{2x}$

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

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?

$\Delta Y \approx f'(x_1)\,\Delta x$

$= \frac{\sqrt{3}}{6}(0.2)$

$= \frac{\sqrt{3}}{30} \approx 0.0577$

$>$

real $y_2 = f(x_2)$

$= f(3.2)$

$= 10 + \sqrt{3.2}$

$\Delta y = y_2 - y_1$

$= (10+\sqrt{3.2}) - (10+\sqrt{3})$

≈ 0.0568

Note: If the function $f(x)$ is linear, the approximation is exact.

$\Delta Y \approx 0.0577$

$\Delta Y = 0.0568$

$\therefore$ the approximation over-estimate