$\frac{dy}{dx} = \frac{d(x^{\frac{1}{2}})}{dx} = \frac{1}{2}x^{\frac{1}{2}-1} = \frac{1}{2}x^{-\frac{1}{2}} = \frac{1}{2} \times \frac{1}{x^{\frac{1}{2}}} = \frac{1}{2} \times \frac{1}{\sqrt{x}} = \frac{1}{2\sqrt{x}}$

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

a) Find the derivative $f'(x)$. $f'(x) = \frac{1}{2\sqrt{x}}$

b) Fill in the table

Point	X	Y	$f'(x)$ (slope)
	0	10	
A	1	11	0.5
B	2	14	0.35
C	3	19	0.29

c) Does the slope increase as x increase? no when $x\uparrow$ $Y\downarrow$

d) Approximate the change in Y when $\Delta x = 0.2$ at $x_1 = 3$. Is the approximation under- or over-estimate? $\Delta y = f'(x_1) \cdot \Delta x = f'(3) \cdot 0.2 = \frac{1}{2\sqrt{3}} \cdot 0.2 = \frac{\sqrt{3}}{30} \approx 0.0577$ #

$x_1 = 3, y_1 = 10 + \sqrt{3} \approx 11.73$

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

real Δy : $y_2 = f(3.2) = 10 + \sqrt{3.2} = 11.79$

$\Delta y = y_2 - y_1 = [(10 + \sqrt{3.2}) - (10 + \sqrt{3})] = 0.0568$

$\therefore$ We are over estimate the real change of y.

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