H.W 1 $y = 10 + \sqrt{x}$

x	y	$\frac{dy}{dx}$ / $\frac{1}{2\sqrt{x}}$
0	10	undefined
1	11	$\frac{1}{2} = 0.5$
2	$10+\sqrt{2}$ (=11.4)	$\frac{1}{2\sqrt{2}} = 0.35$
3	$10+\sqrt{3}$ (11.2)	$\frac{1}{2\sqrt{3}} = 0.21$

Find. $\frac{dy}{dx}$

Approximate Δy when $x = 2$, $\Delta x = 0.1$ and $\Delta x = -0.2$.

Compare the actual Δy to find the errors.

$y = 10 + \sqrt{x}$

$y' = 0 + x^{\frac{1}{2}}$

$y' = 0 + \frac{1}{2}x$

$y = 0 + \frac{1}{2}x^{-\frac{1}{2}}$

$y' = 0 + \frac{1}{2\sqrt{x}}$

$y' = \frac{1}{2\sqrt{x}}$

① $x = 2$, $\Delta x = 0.1$

$2 \to 2.1$

$\Delta y = \frac{dy}{dx} \cdot \Delta x$

$= 0.35 \cdot 0.1$

$\Delta y = 0.035$

$x = 2.1$, $y = 10 + \sqrt{2.1}$

$\therefore \Delta y = 10 + \sqrt{2.1} - 11.4$

≈ 0.05

$\therefore 0.05 - 0.035 = 0.015$

② $x = 2$, $\Delta x = -0.2$

$2 \to 1.8$

$\Delta y = \frac{dy}{dx} \cdot \Delta x$

$= (0.35) \cdot (-0.2)$

$\Delta y = -0.07$

$x = 1.8$, $y = 10 + \sqrt{1.8}$

$\therefore \Delta y = (10 + \sqrt{2}) - (10 + \sqrt{1.8})$

$\approx 0.073 = 0.07$

$\therefore 0.07 - 0.07 = 0$

H.W. 2 Find 2nd order of derivative of $y = 10 + \sqrt{x}$

and plot the graph of y and $\frac{dy}{dx}$.

Is the slope of slope a constant.

x	y	$\frac{dy}{dx} = \frac{1}{2\sqrt{x}}$	$\frac{d^2y}{dx^2} = \frac{1}{2x\sqrt{x}}$
0	10	undefined	undefined
1	11	0.5	0.5
2	11.4	0.35	0.18
3	11.7	0.29	0.10

$\therefore$ slope is not constant

$\rightarrow \frac{d^2y}{dx^2} = \frac{d}{dx}\left(\frac{dy}{dx}\right) = \frac{d}{dx}\left(\frac{1}{2\sqrt{x}}\right)$

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