H.W. $y = 10 + \sqrt{x}$ Find dy/dx, Approximate Δy when $x=2$, $\Delta x = 0.1$ and $\Delta x = -0.2$

Compare the actual Δy to find the errors.

x	y	$dy/dx = \frac{1}{2\sqrt{x}}$
0	10	0
1	11	$\frac{1}{2}$
2	$10+\sqrt{2}$	$\frac{1}{2\sqrt{2}}$
3	$10+\sqrt{3}$	$\frac{1}{2\sqrt{3}}$

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

1) $\Delta y = \frac{dy}{dx}$: slope $= \frac{1}{2\sqrt{2}}(0.1)$

$= \frac{1}{2\sqrt{2}} \cdot \frac{1}{10}$

$= \frac{1}{20\sqrt{2}}$ #

actual Δy, เมื่อ $x=2$, $y = 10\sqrt{2}$

y ใหม่ $= 10 + \sqrt{2.1}$

$y : 10 + \sqrt{x}$

$= 10 + \sqrt{2.1}$

$\Delta y \approx y_{new} - y_{in\ table}$

$= [10 + \sqrt{2.1}] - [10 + \sqrt{2}]$

$= 10 + \sqrt{2.1} - 10 - \sqrt{2}$

$= \sqrt{2.1} - \sqrt{2}$ #

2) $\Delta y = \frac{1}{2\sqrt{2}}(-0.2)$

$= \frac{1}{2\sqrt{2}}\left(-\frac{2}{10}\right)$

$= \frac{-2}{20\sqrt{2}} = \frac{-1}{10\sqrt{2}}$ #

actual Δy

$y : 10 + \sqrt{x}$

$= 10 + \sqrt{1.9}$

$\Delta y \approx y_{new} - y_{in\ table}$

$= [10 + \sqrt{1.9}] - [10 + \sqrt{2}]$

$= 10 + \sqrt{1.9} - 10 - \sqrt{2}$

$= \sqrt{1.9} - \sqrt{2}$ #

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

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

Is the slope of slope a constant.

$$\frac{dy}{dx} \quad y = 10 + \sqrt{x}$$

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

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

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

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

x	Y	$\frac{dy}{dx}$	$\frac{dy}{dx}$ 2^{nd}
0	10	0	0
1	$10+\sqrt{1}$	$\frac{1}{2\sqrt{1}}$	$-\frac{1}{4\sqrt{4}}$
2	$10+\sqrt{2}$	$\frac{1}{2\sqrt{2}}$	$-\frac{1}{8\sqrt{2}}$
3	$10+\sqrt{3}$	$\frac{1}{2\sqrt{3}}$	$-\frac{1}{12\sqrt{3}}$

$$\frac{dy}{dx}\left(\frac{1}{2\sqrt{x}}\right) = \frac{dy}{dx}\left(\frac{1}{2} \cdot x^{-\frac{1}{2}}\right)$$

$$= -\frac{1}{4} x^{-\frac{3}{2}}$$

$$= -\frac{1}{4x\sqrt{x}}$$