HW #1 Due Tuesday 25 August 2020

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

x	y	dy/dx
0		
1		
2		
3		

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.

H.W. Find 2nd order derivative of $y = 10 + \sqrt{x}$ and plot the graph of y and $\frac{dy}{dx}$.
Is the slope of slope a constant.

① $y = 10 + \sqrt{x}$

x	y	dy/dx
0	10	0
1	11	$1/2$
2	11.41	$1/\sqrt{8}$
3	11.73	$1/\sqrt{12}$

$y = 10 + \sqrt{x}$

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

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

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

1) Approximate Δy when $x=2$, $\Delta x = 0.1$

$\Delta y = \frac{dy}{dx} \cdot \Delta x$; $x=2$; $\frac{dy}{dx} = \frac{1}{\sqrt{8}}$

$\Delta y = \frac{1}{\sqrt{8}} \cdot 0.1$

$= \frac{0.1}{\sqrt{8}} = 0.035$

Compare the actual y to find errors

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

$= 11.45$

$x = 2$; $y = 10 + \sqrt{2}$

$= 11.41$

$\therefore x(2.1) - x(2) = 0.04$

$0.04 - 0.035 = 0.005$

2) Approximate Δy when $x=2$, $\Delta x = -0.2$

$\Delta y = \frac{dy}{dx} \cdot \Delta x$; $x=2$; $\frac{dy}{dx} = \frac{1}{\sqrt{8}}$

$= \frac{1}{\sqrt{8}} \cdot -0.2$

$= \frac{-0.2}{\sqrt{8}} = 0.07$

Compare the actual y to find errors

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

$= 11.34$

$x = 2$; $y = 10 + \sqrt{2}$

$= 11.41$

$x(2) - x(1.8) = 0.07$

$0.07 - 0.07 = 0$

(2) Find 2nd order derivative of $y = 10 + \sqrt{x}$ and plot the graph of y and $\frac{dy}{dx}$. Is the slope constant

- Find 2nd derivative of $y = 10 + \sqrt{x}$

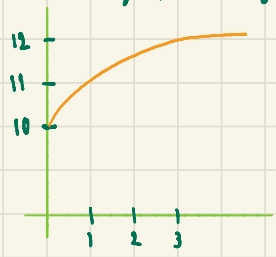
$$\frac{dy}{dx} = \frac{1}{2} x^{-\frac{1}{2}}$$

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

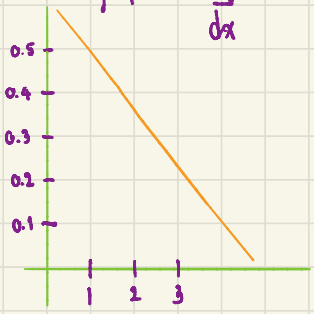
$$\frac{d^2y}{dx^2} = \frac{1}{2x\sqrt{x}}$$

x	y	dy/dx	d^2y/dx^2
0	10	0	0
1	11	1/2	1/2
2	11.41	$1/\sqrt{8}$	$1/4\sqrt{2}$
3	11.73	$1/\sqrt{12}$	$1/6\sqrt{3}$

- Plot the graph of y



- Plot the graph of $\frac{dy}{dx}$



- Is the slope constant

No.

Phu Amratisha 6304641043