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HW. $y = 10 + \sqrt{x}$

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 error.

x	y	dy/dx
0		
1		
2		
3		

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

x	y	dy/dx
0	10	0
1	10	$\frac{1}{2}$
2	$10 + \sqrt{2}$	1
3	$10 + \sqrt{3}$	0.28

• when $x = 2, y = 10 + \sqrt{2}$

$\Delta x = 0.1$

$$\Delta y \approx \frac{\Delta y}{\Delta x} \cdot \Delta x \approx 1 \cdot (0.1) \approx 0.1 \#$$

$\Delta x = -0.2$

$$\Delta y \approx \frac{\Delta y}{\Delta x} \cdot \Delta x \approx 1 \cdot (-0.2) \approx -0.2 \#$$

• real change in y

$$x = 2.1, y = 10 + (2.1)^2 = 14.41$$

$$\therefore \Delta y = 14.41 - 10\sqrt{2} = 0.268 \#$$

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.

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

2nd order ; $\frac{d}{dx} \left(\frac{dy}{dx} \right) = \frac{d^2 y}{dx^2} = -\frac{x^{-\frac{3}{2}}}{4} \rightarrow$ the slope of slope is not a constant

