

H.W. ① $y = 10 + \sqrt{x}$

Find $\frac{dy}{dx}$? Approximate Δy when $x=2$, $\Delta x=0.1$ and $\Delta x=-0.2$

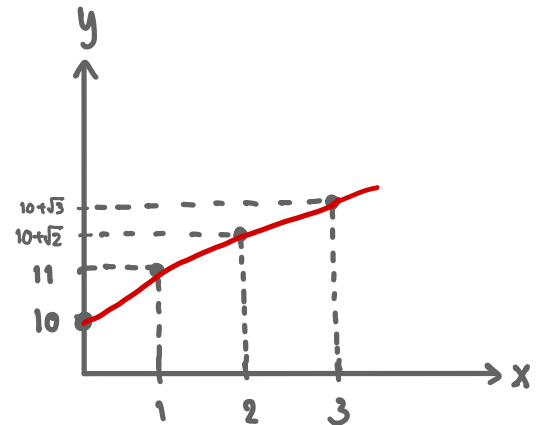
Compare the actual Δy to find the errors.

X	y	$\frac{dy}{dx} = \frac{1}{2\sqrt{x}}$
0	10	$\frac{1}{0}$
1	11	$\frac{1}{\sqrt{2}} \approx 0.71$
2	$10+\sqrt{2}$ 11.41	$\frac{1}{2\sqrt{2}} \approx 0.35$
3	$10+\sqrt{3}$	$\frac{1}{2\sqrt{3}} \approx 0.29$

$$\frac{dy}{dx} \frac{d}{dx} (10 + \sqrt{x}) = \frac{1}{2\sqrt{x}}$$

slope at a point $x=2$

$$x=2 ; \frac{dy}{dx} = \frac{1}{2\sqrt{x}} = \frac{1}{2\sqrt{2}}$$



- when $x=2$, $y=10+\sqrt{2}$ (slope = $\frac{1}{2\sqrt{2}}$)

$\Delta x = 0.1 \rightarrow x$ increasing from 2 to 2.1

$$\begin{aligned} \Delta y &\approx \frac{dy}{dx} \cdot \Delta x \\ &= \frac{1}{2\sqrt{x}} (0.1) \\ &= \frac{0.1\sqrt{2}}{4} = 0.035 \end{aligned}$$

$$x=2, y=10+\sqrt{2} \approx 11.41$$

$$\begin{aligned} \therefore \Delta y &= 11.41 - 0.035 \\ &= 11.375 \end{aligned}$$

$\Delta x = -0.2 \rightarrow x$ decreasing from 2 to 1.8

$$\begin{aligned} \Delta y &\approx \frac{dy}{dx} \cdot \Delta x \\ &= \frac{1}{2\sqrt{x}} (-0.2) \\ &= -0.075 \end{aligned}$$

$$x=2, y=10+\sqrt{2} \approx 11.41$$

$$\begin{aligned} \therefore \Delta y &= 11.41 + 0.075 \\ &= 11.485 \end{aligned}$$