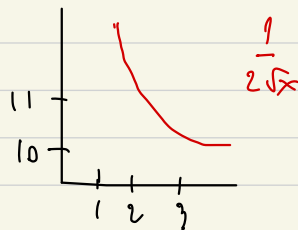
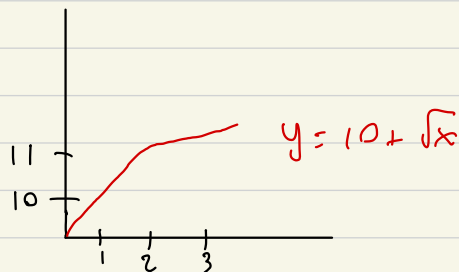


Home work Graph



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



x	y	$\frac{dy}{dx} = \frac{1}{2\sqrt{x}}$	$\frac{d^2y}{dx^2} = -\frac{1}{4\sqrt{x^3}}$
0	10	undefined	
1	11	$\frac{1}{2}$	$\frac{1}{4\sqrt{x^3}}$
2	11.414	$\frac{1}{2\sqrt{2}}$	$\frac{1}{4\sqrt{x^3}}$
3	11.732	$\frac{1}{2\sqrt{3}}$	$-\frac{1}{4\sqrt{x^3}}$

$$\frac{d^2y}{dx^2} = \frac{d}{dx} \left(\frac{dy}{dx} \right) = \frac{dy}{dx} \cdot \frac{1}{2\sqrt{x}} = -\frac{1}{4} x^{-\frac{3}{2}}$$

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

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

x	y	$\frac{dy}{dx} = \frac{1}{2\sqrt{x}}$
0	10	undefined
1	11	$\frac{1}{2}$
2	11.414	$\frac{1}{2\sqrt{2}}$
3	11.732	$\frac{1}{2\sqrt{3}}$

find $\frac{dy}{dx}$

Approximate Δy

when $x=2$, $\Delta x = 0.1$ and $\Delta x \approx 0.2$

compare the actual Δy to find the errors.

when $x=2$ $y = 11.414$ (slope $\frac{1}{2\sqrt{2}}$)
 $\Delta x = 0.1$ x increasing from 2 to 2.1

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

$$= \frac{1}{2\sqrt{2}} \times 0.1 = 0.035$$

$$x = 2.1, y = 10 + \sqrt{2.1} = 11.449$$

$$\therefore \Delta y = 11.449 - 11.414 = 0.035$$

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

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

$$= \frac{1}{2\sqrt{2}} \times -0.2 = -0.070$$

$$x = 1.8, y = 10 + \sqrt{1.8} = 11.341$$

$$\therefore \Delta y = 11.449 - 11.341 = 0.108$$