

1.)  $y = 10 + \sqrt{x}$

| $x$ | $y$    | $\frac{dy}{dx} = \frac{x}{2}$ |
|-----|--------|-------------------------------|
| 0   | 10     | 0                             |
| 1   | 11     | 0.5                           |
| 2   | 11.414 | 1                             |
| 3   | 11.732 | 1.5                           |

Approximate  $\Delta y$  when  $x = 2$ ,  $\Delta x = 0.1, -0.2$   
 $y = 11.414$

$$\Delta y \approx \frac{dy}{dx} \Delta x = 1(0.1) = 0.1$$

$$\approx \frac{dy}{dx} \Delta x = 1(-0.2) = -0.2$$

, the actual  $\Delta y$  when  $x = 2$  is 11.414  
 $\Delta x = 0.1, -0.2$

$$\Delta y = 10 + \sqrt{2.1} = 11.449$$

$$= 10 + \sqrt{1.8} = 11.341$$

the real change in  $\Delta y = 11.449 - 11.414 = 0.035$

$$\Delta y = 11.341 - 11.414 = -0.073$$

$\therefore$  the error is  $0.1 - 0.035 = 0.065$

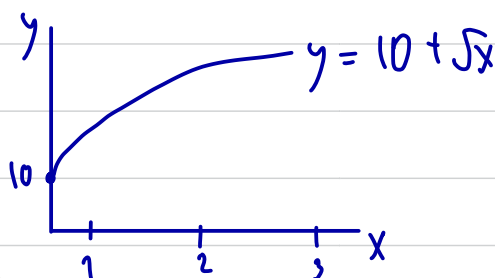
$$, -0.2 - (-0.073) = -0.127 \quad \times$$

2)

2<sup>nd</sup> - derivative of  $y = 10 + \sqrt{x}$   $\frac{dy}{dx} = \frac{x}{2}$

| $x$ | $y$    | $\frac{dy}{dx}$ | $\frac{d^2y}{dx^2} = \frac{d}{dx}(\frac{dy}{dx}) = \frac{d}{dx}(\frac{x}{2}) = \frac{1}{2}$ | so slope of slope = $\frac{1}{2} > 0$<br>means that slope is increasing |
|-----|--------|-----------------|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| 0   | 10     | 0               | $\frac{1}{2}$                                                                               |                                                                         |
| 1   | 11     | 0.5             | $\frac{1}{2}$                                                                               |                                                                         |
| 2   | 11.414 | 1               | $\frac{1}{2}$                                                                               |                                                                         |
| 3   | 11.732 | 1.5             | $\frac{1}{2}$                                                                               |                                                                         |

, and graph will be . . .



$$\text{slope} = \frac{dy}{dx} = \frac{1}{2}x$$

