

Exercise 15

(a) Find the differential dy and (b) evaluate dy for the given values of x and dx .

$$y = e^{x/10}, \quad x = 0, \quad dx = 0.1$$

Solution

Compute the derivative of y .

$$\begin{aligned} \frac{dy}{dx} &= \frac{d}{dx}(e^{x/10}) \\ &= e^{x/10} \cdot \frac{d}{dx} \left(\frac{x}{10} \right) \\ &= e^{x/10} \cdot \left(\frac{1}{10} \right) \\ &= \frac{1}{10} e^{x/10} \end{aligned}$$

Consequently, the differential of $y = e^{x/10}$ is

$$dy = \frac{1}{10} e^{x/10} dx.$$

If $x = 0$ and $dx = 0.1$, then

$$dy = \frac{1}{10} e^0 (0.1) = \frac{1}{100} = 0.01.$$