

1.16 In Module 1.2, set $f = 1$ Hz, $\lambda = 2$ cm, and $\alpha = 0.5$ Np/cm. Estimate the amplitude $y(x)$ of the blue wave at its first maximum (at $x = 0$) and at its second maximum (at $x = 2$ cm). Compute the ratio $y(2 \text{ cm})/y(0)$. Does the result match your expectations, given the values of f , λ , and α ?

Solution: For the blue wave, from the plot

$$y(0) = 5,$$

$$y(2 \text{ cm}) \approx 1.7.$$

Hence,

$$\frac{y(2 \text{ cm})}{y(0)} \approx \frac{1.7}{5} = 0.34.$$

From the expression for $y(x)$,

$$y(2 \text{ cm}) = \left. \frac{5e^{-\alpha x}}{5} \right|_{x=2}$$

$$= e^{-0.5 \times 2} = e^{-1} \approx 0.37.$$

The result confirms the approximate value obtained from the plot.

