

Explanation - ex05_cfd0

Exercise 1

a.

Calculating the Integral of the giving function over the Interval $[0, 1]$:

$$I = 0.693147$$

b.

Given the function $f(x) = 1/(1+x)$ and the interval $[0, 1]$, we'll compute the lower sum approximation I_h for the integral of $f(x)$ over this interval with a mesh size $h = 0.01$. Number of Subintervals: $n = 1-0/0.01 = 100$

For each subinterval, the area of the rectangle is given by the Area of the rectangle $f(x_i) \cdot h$ where x_i is the left endpoint of the i -th subinterval.

We will sum up the areas of these rectangles to approximate the integral.

Using the correct Sum-formula (below) we will get the lower sum approximation I_h , it is approximately 0.6957.

$$I_h = \sum_{i=0}^{n-1} f(a + i \cdot h) \cdot h$$

And if we compare that with the value from 1a. we see a close similarity.

c.

The error ϵ_h

$$= I_h - I$$

$$= 0.6957 - 0.693147$$

$$= 0.002553$$