Given the integral

\[ \int_0^1 e^{-x} \, dx \]

1. [5 pts] Find the left-hand sum (n=5)

Solution \( \Delta x = 1/5 = 0.2 \), so the left hand sum is given by

\[ e^0.2 + e^{-0.2}0.2 + e^{-0.4}0.2 + e^{-0.6}0.2 + e^{-0.8}0.2 = 0.6974382799 \]

2. [5 pts] Find the right-hand sum (n=5)

Solution

\[ e^{-0.2}0.2 + e^{-0.4}0.2 + e^{-0.6}0.2 + e^{-0.8}0.2 + e^{-1.0}0.2 = 0.5710141681 \]

3. [5 pts] Find the exact answer. Solution The exact integral is given by

\[ -e^{-x}\big|_{x=0}^{x=1} = -e^{-1} - (-1) = 1 - e^{-1} = 0.6321205588 \]