Single Application Trapezoidal Rule: Example

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Single Application Trapezoidal Rule: Example

The following integral is given

$$\int_{0.1}^{1.3} 5xe^{-2x}dx$$

a) Use the trapezoidal rule to estimate the value of the integral.

b) Find the true error, E_t for part (a).

c) Find the absolute relative true error, $|\varepsilon_t|$ for part (a).

$$\int_{0.1}^{1.3} 5xe^{-2x}\,dx$$

$$\int_a^b f(x)\,dx \simeq (b-a)\left(\frac{f(a)+f(b)}{2}\right)$$

a) $$\int_{0.1}^{1.3} 5xe^{-2x} = (1.3-0.1)\left(\frac{f(0.1)+f(1.3)}{2}\right)$$

$$= 1.2\left(\frac{5(0.1)e^{-2(0.1)} + 5(1.3)e^{-2(1.3)}}{2}\right)$$

$$= 1.2\left(\frac{0.40937 + 0.48218}{2}\right)$$

$$= 0.53529$$

b) E_t = True Value - Appr. Value

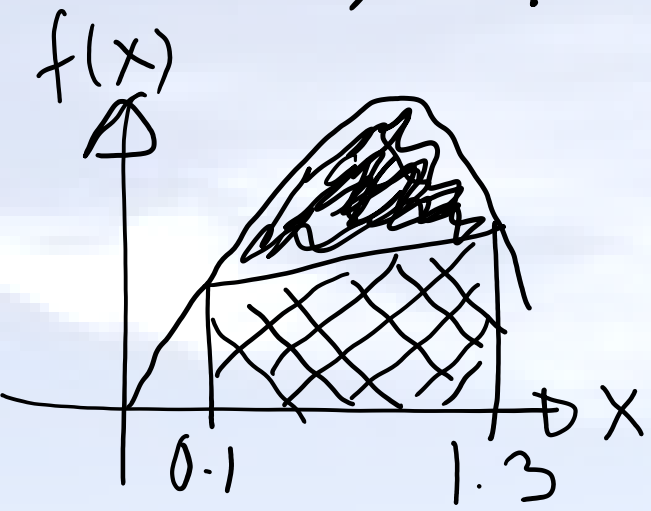
$= 0.89387 - 0.53529$

$= 0.35858$

c) $|\epsilon_t| = \left| \frac{E_t}{\text{True value}} \right| * 100$

$= \left| \frac{0.35858}{0.89387} \right| * 100$

$= 40.115\%$



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