

7.6' Q6,

Solution

$$\text{Error using } n=1 ; \quad 4 - 2.346 = 1.654_{//}$$

for $n=30$

a, Since the LEFT approximation is proportional to $1/n$, we divide the error by 3 (i.e. $1/10 \times \frac{1}{3} = 1/30$).

$$\therefore \text{LEFT}(30) = \frac{\text{Error}}{3} = 0.5513$$

$$\text{Error ; } 4 - 0.5513 \approx 3.449_{//}$$

b, also the approximation of the TRAP is proportional to $1/n^2$

$$\text{Hence } \text{TRAP}(30) = \frac{\text{Error}}{3^2} = \frac{1.654}{9} = 0.1838$$

$$\text{Error ; } 4 - 0.1838 \approx 3.8162_{//}$$

c, the SIMPSON approximation is proportional to $1/n^4$

$$\text{SIMP}(30) = \frac{\text{Error}}{3^4} = \frac{1.654}{81} = 0.0204$$

$$\text{Error ; } 4 - 0.0204 \approx 3.9796_{//}$$

Comment

Some students wanted to use formulas to answer the question but the parameters of the formula were not obvious from the question.

eg. if one uses

$$\text{Simp}(n) = \frac{2 \times \text{mid}(n) + \text{TRAP}(n)}{3}$$

then $\text{mid}(n)$ and $\text{TRAP}(n)$ will have to be found, which is not quite obvious from the information given.