

5.3.5

Express the limit as a definite integral

$$\lim_{\|P\| \rightarrow 0} \sum_{k=1}^n \left(\frac{1}{1-c_k} \right) \Delta x_k \quad \text{where } P \text{ is}$$

a partition of $[2, 3]$.

Solution

Recall that

$$\lim_{\|P\| \rightarrow 0} \sum_{k=1}^n f(c_k) \Delta x_k = \int_a^b f(x) dx$$

where P is a partition of $[a, b]$.

Well, we have $[a, b] = [2, 3]$ so

here $a = 2$ and $b = 3$. Next, the

integrand is $f(x)$ where we have

$$f(c_k) = \frac{1}{1-c_k} \quad \text{and hence } f(x) = \frac{1}{1-x}.$$

Therefore, the definite integral given
by the limit is

$$\int_a^b f(x) dx = \boxed{\int_2^3 \left(\frac{1}{1-x} \right) dx} \quad \square$$