



The diagram illustrates the numerical integration of a function $f(x)$ over the interval $[a, b]$. On the left, a graph shows a curve $f(x)$ with a yellow shaded area under it from $x=a$ to $x=b$. This area is approximated by a sum of weighted function values at discrete points x_i . The approximation is given by the formula:

$$\int_a^b f(x) dx \approx (b-a) \sum_{i=0}^n w_i f(x_i)$$

The summation is shown in a box with n at the top and $i=0$ at the bottom. A blue line indicates the width of the interval $[a, b]$ is $b-a$.