$$\int_a^b f(x)\,\mathrm{d}x = \lim_{\Delta x \to 0} \sum_{k=1}^{n} \min(f(x_k), f(x_k + \Delta x))\Delta x$$

$$= \lim_{\Delta x \to 0} \sum_{k=1}^{n} \max(f(x_k), f(x_k + \Delta x))\Delta x$$