Single Application Trapezoidal Rule: Derivation

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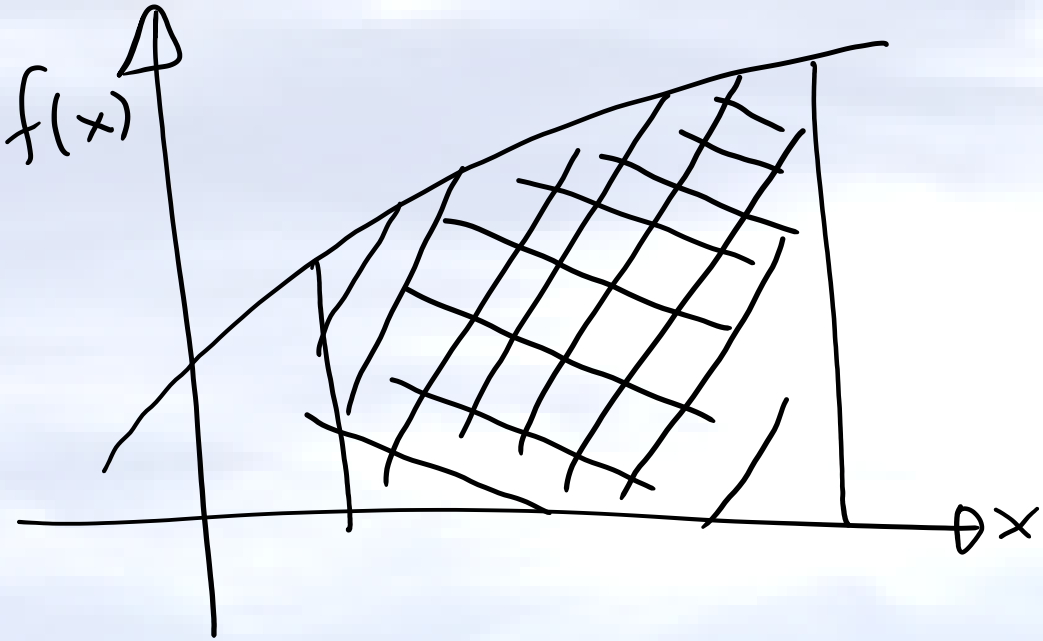
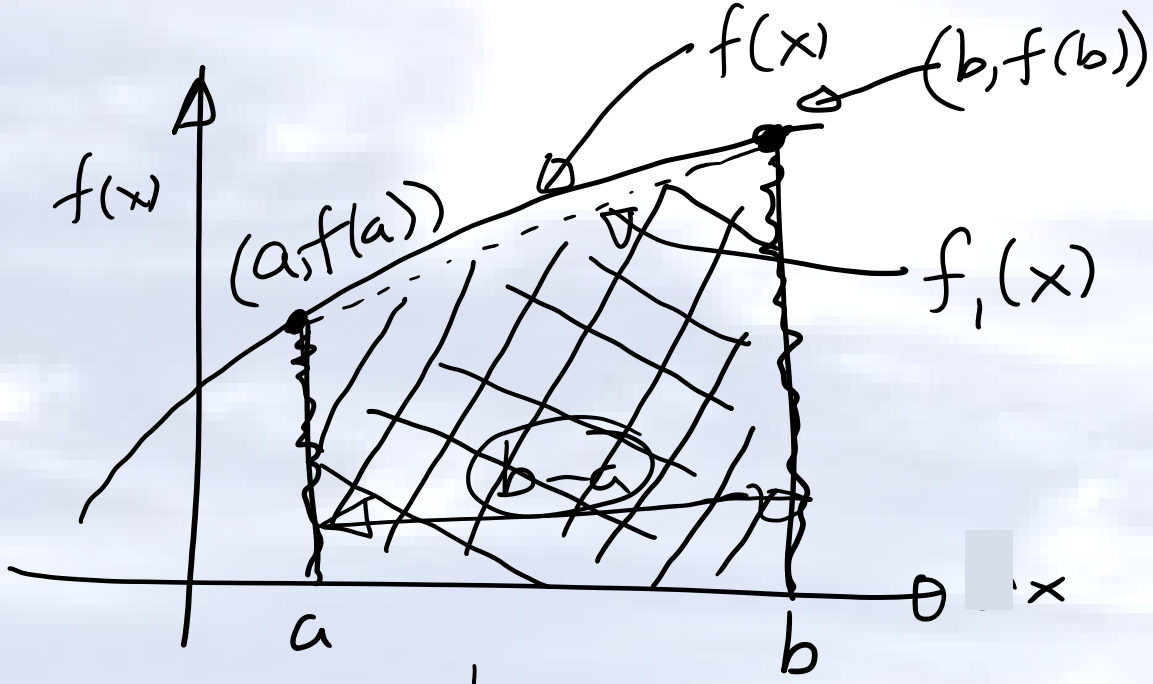
$$\int_a^b f(x)\,dx$$





$$\int_a^b f(x)\,dx \simeq \int_a^b f_1(x)\,dx$$

$$= \frac{1}{2}\left(\text{Sum of the length of the } \| \text{ sides}\right) * \left(\text{Perpend. dist. between } \| \text{ sides}\right)$$

$$= \frac{1}{2}\left(f(a)+f(b)\right)(b-a)$$

$$= (b-a)\left(\frac{f(a)+f(b)}{2}\right)$$

$$\bar{f} = \frac{\int_a^b f(x)\,dx}{b-a}$$

$$\int_a^b f(x)\,dx = (b-a)\bar{f}$$

$$\simeq \frac{f(a)+f(b)}{2}$$

END

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