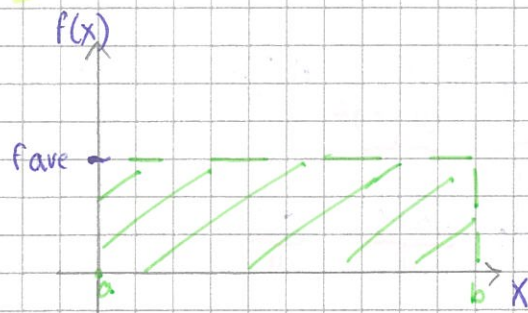
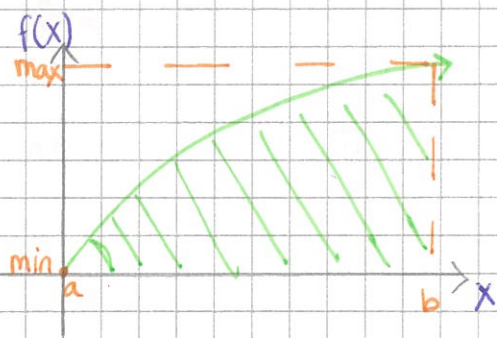


Section 4.8 The Average Value of Functions



$$\int_a^b f(x) dx = f_{\text{ave}} (b-a)$$

$$\therefore f_{\text{ave}} = \frac{1}{b-a} \int_a^b f(x) dx$$

Example 1: Find f_{ave} for $f(x) = \sqrt{x}$ on $[0, 9]$

$$f_{\text{ave}} = \frac{1}{9-0} \int_0^9 x^{1/2} dx$$

$$= \frac{1}{9} \cdot \frac{2}{3} x^{3/2} \Big|_0^9$$

$$= \frac{2}{27} [9^{3/2} - 0]$$

$$= \frac{2}{27} [27] = \boxed{2}$$

Example 2: Find V_{ave} on $[1, 4]$ given

$$V(t) = 3t^3 + 2$$

$$V_{\text{ave}} = \frac{1}{b-a} \int_a^b v(t) dt$$

$$= \frac{1}{3} \int_1^4 3t^3 + 2 dt$$

$$= \frac{1}{3} \left[\frac{3}{4} t^4 + 2t \Big|_1^4 \right]$$

$$= \frac{1}{3} \left[\left(\frac{3}{4} (256) + 8 \right) - \left(\frac{3}{4} + 2 \right) \right]$$

$$\frac{1}{3} \left[192 + 8 - \frac{11}{4} \right]$$

$$= \frac{263}{4}$$