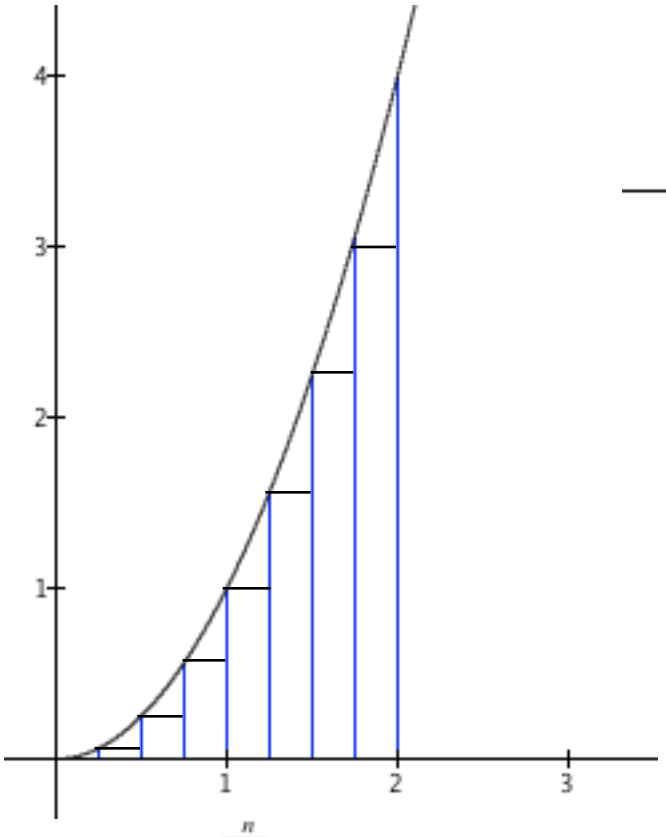

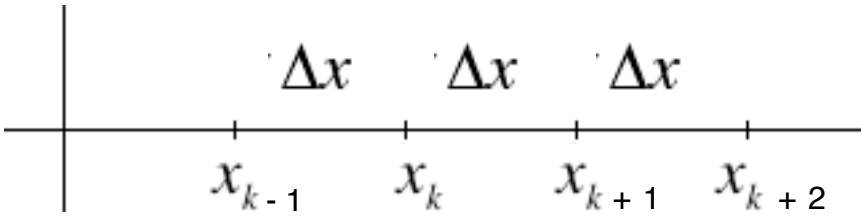

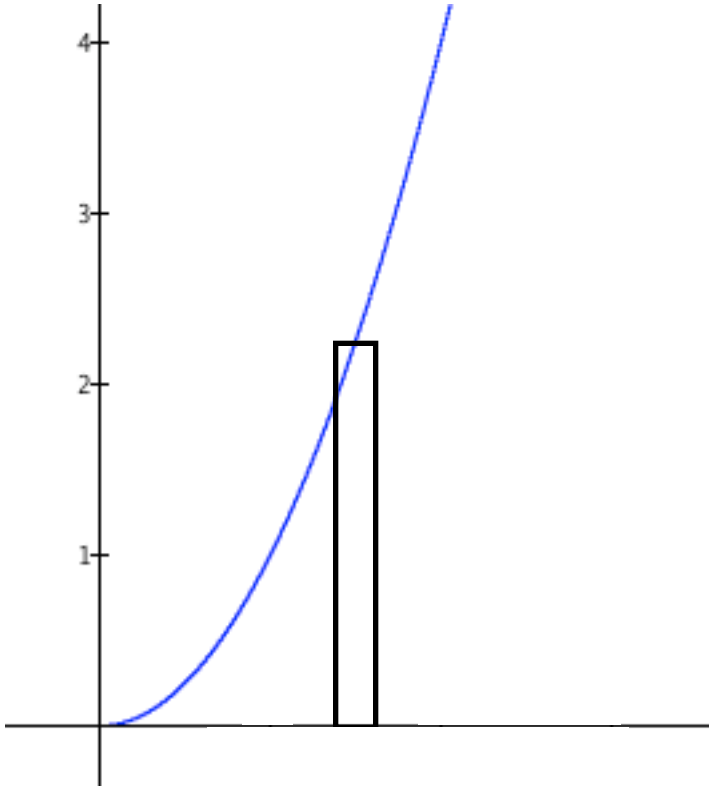

$$Area = \sum_{k=1}^{n} (x_k)^2 \Delta x$$

$$= \sum_{k=1}^{n} \left(k \cdot \frac{x}{n} \right)^2 \left(\frac{x}{n} \right)$$

$$= \left(\frac{x}{n} \right)^3 \sum_{k=1}^{n} k^2$$

$$= \left(\frac{x}{n} \right)^3 \frac{n(n+1)(2n+1)}{6}$$

$$= \frac{x^3}{6} \cdot \frac{2n^3 + 3n^2 + n}{n}$$

$$= \frac{x^3}{6} \cdot \left(2 + \frac{3}{n} + \frac{1}{n^2} \right)$$

Now apply

$$\lim_{n \to \infty} \left(\frac{x^3}{6} \cdot \left(2 + \frac{3}{n} + \frac{1}{n^2} \right) \right)$$