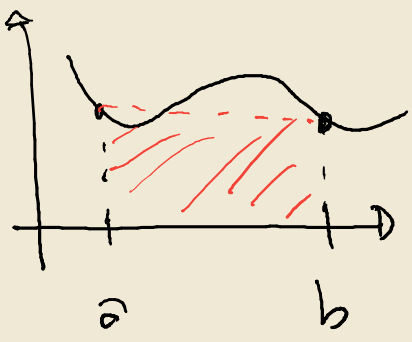
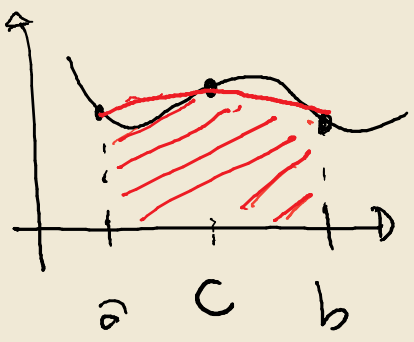
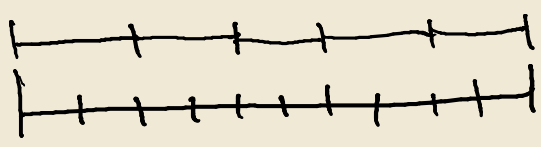




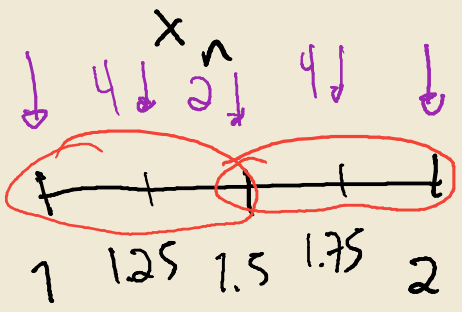
$c = \frac{a+b}{2}$, $\quad x_0 = a,\ x_1 = c,\ x_2 = b,$

$h = \frac{b-a}{2}$

$$\int_a^b f(x)dx \approx \frac{h}{3}\left[f(x_0) + 4f(x_1) + f(x_2)\right]$$ → Simpson



x_0 $\qquad$ x_n

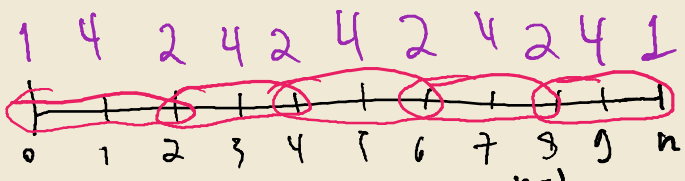


Ex.: $\int_1^2 \ln x\,dx$ $\qquad h = 0.25$, $\quad n = 4$

$$\approx \frac{h}{3}\left[\ln 1 + 4\times\ln 1.25 + \ln 1.5\right] + \frac{h}{3}\left[\ln 1.5 + 4\times\ln 1.75 + \ln 2\right]$$ ($h = 0.25$)

$$= \frac{0.25}{3}\left[\ln 1 + 4\times(\ln 1.25 + \ln 1.75) + 2\times\ln 1.5 + \ln 2\right]$$

$$\approx 0.3863$$



$$\int_{x_0}^{x_n} f(x)dx \approx \frac{h}{3}\left[f(x_0) + 4\times\sum_{i=1,3,5,\ldots}^{n-1} f(x_i) + 2\times\sum_{i=2,4,6,\ldots}^{n-2} f(x_i) + f(x_n)\right]$$

$$\sum_{i=1}^{\frac{n}{2}+1} f(x_{2i-1})$$

n é par (intervalos)

$$E_{SR} = -\frac{(b-a)h^4}{180} f^{(iv)}(\mu)$$

Qual o h p/ $|E_{SR}| < 10^{-6}$. Use prec. do comp.

$f(x) = \ln x$; $\quad f''(x) = \frac{-1}{x^2}$, $\quad f'''(x) = \frac{2}{x^3}$, $\quad f^{(iv)}(x) = \frac{-6}{x^4}$.

$$|f^{(iv)}(\mu)| \leq \max_{x\in[1,2]} |f^{(iv)}(x)| = 6.$$

$$|E_{SR}| \leq \frac{h^4\cdot(2-1)}{180}\cdot 6 = \frac{h^4}{30} < 10^{-6}$$

$$h < \sqrt[4]{30\times 10^{-6}} \Rightarrow n = \frac{b-a}{h} > \frac{1}{\sqrt[4]{30\times 10^{-6}}} \approx 13.5$$

⇒ 14 intervalos.