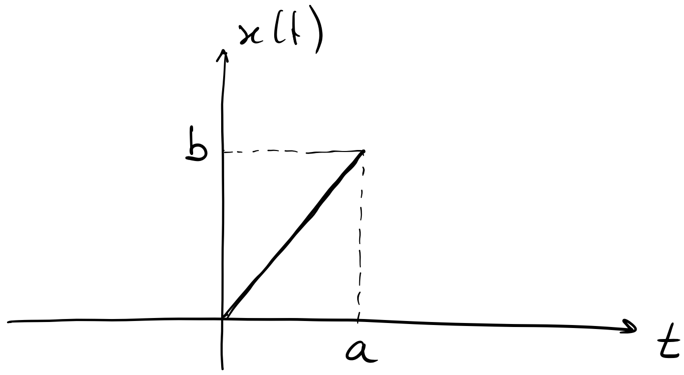
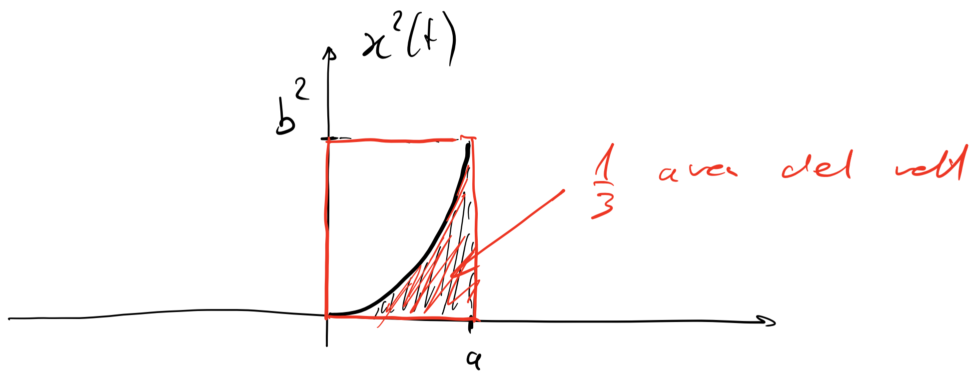
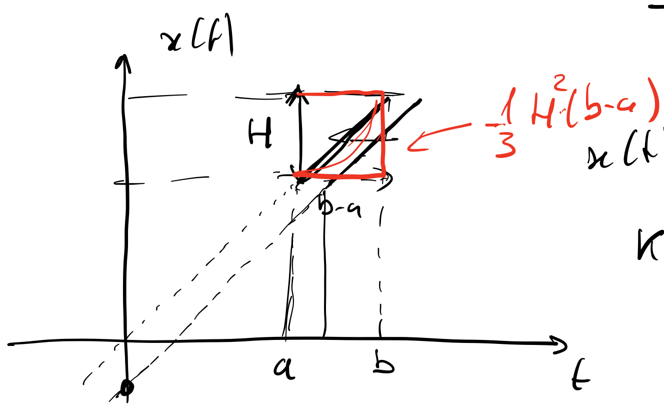




$$x(t) = \frac{b}{a}\,t$$

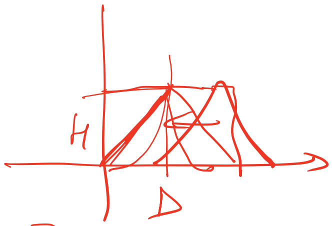
$$\int_0^a x^2(t)\,dt = \int_0^a \frac{b^2}{a^2}\,t^2\,dt = \frac{b^2}{a^2}\,\frac{t^3}{3}\Big|_0^a = \frac{b^2}{a^2}\left(\frac{a^3}{3} - 0\right)$$

$$= \frac{b^2 a}{3} = \frac{1}{3}\,a b^2$$

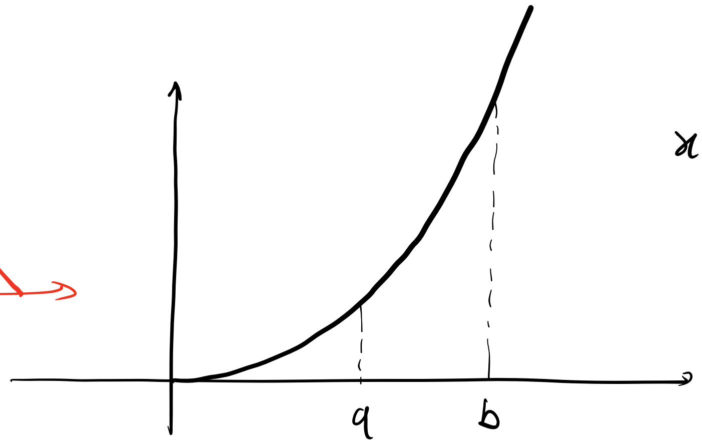


$$x(t) = K t$$

$$K = \frac{H}{b-a}$$



$\frac{2}{3} \cdot HD$



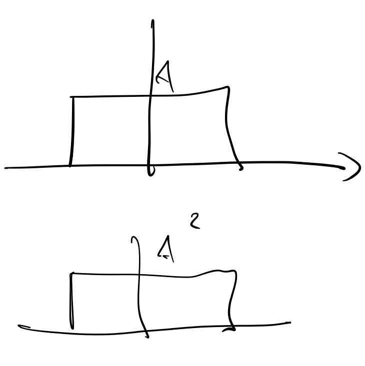
$x^2(t) = k^2 t^2$

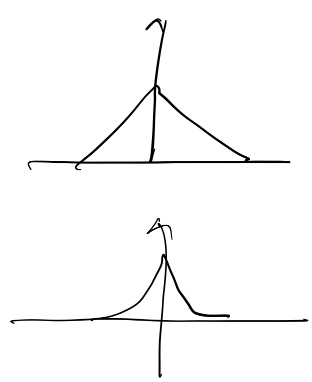
$$\int_a^b k^2 t^2 \, dt = k^2 \frac{t^3}{3}\Big|_a^b = k^2 \frac{b^3 - a^3}{3}$$

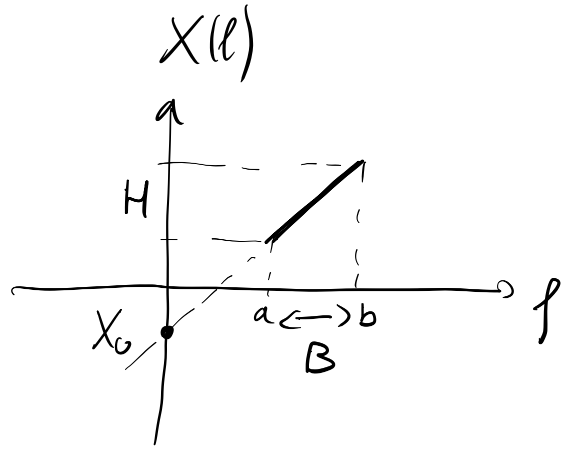
$$= \frac{H^2}{(b-a)^2} \frac{b^3 - a^3}{3} = \frac{H^2 (b^3 - a^3)}{3(b-a)^2} \neq (b-a)^3$$

$$\left[-\left(+X_1(f) + X_2(f)\right)\right]^2 = X_2^2(f) + X_1^2(f) + 2 X_1(f) X_2(f)$$

rect tri rect regola $\frac{1}{3}$





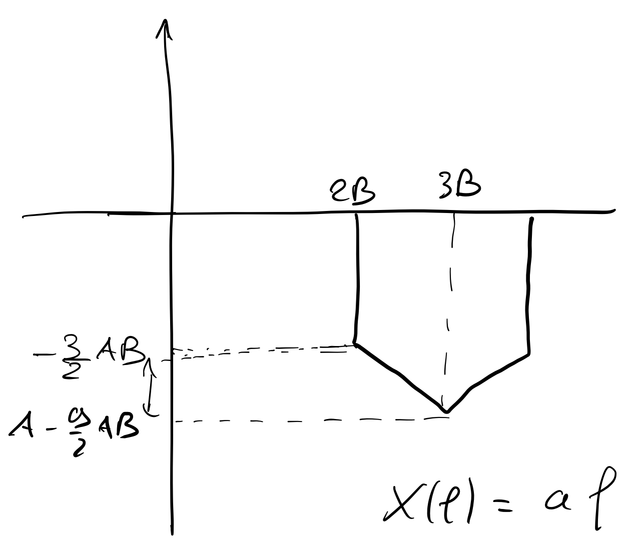


$$X(f) = af + b$$

$$= \frac{H}{B} f + X_0$$

$$\int_a^b X^2(f)\, df = \int_a^b \left(\frac{H}{B} f + X_0\right)^2 df$$

$A - \frac{9}{2} AB$



$X(f) = af + b$

$$a = \frac{A - \frac{9}{2}AB + \frac{3}{2}AB}{B} = \boxed{\frac{A - 3AB}{B}}$$

$$a \cdot 2B + b = -\frac{3}{2}AB$$

$$b = -\frac{3}{2}AB - 2Ba = -\frac{3}{2}AB - 2\left(A - 3AB\right)$$

$$b = \left(-\frac{3}{2} + 6\right)AB - 2A = \boxed{\frac{9}{2}AB - 2A}$$

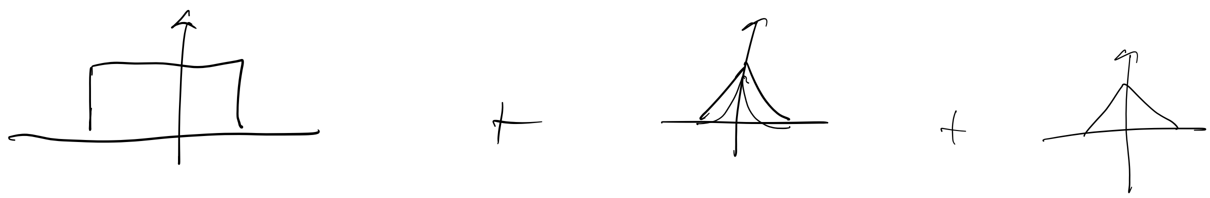
$$X(f) = \underbrace{\frac{A - 3AB}{B}}_{a} f + \underbrace{\frac{9}{2}AB - 2A}_{b}$$

$$\int_{2B}^{3B} (af + b)^2 \, df = \int_{2B}^{3B} a^2 f^2 + b^2 + 2abf \, df$$

$$= a^2 \frac{f^3}{3}\Big|_{2B}^{3B} + b^2 B + \cancel{2}ab \frac{f^2}{\cancel{2}}\Big|_{2B}^{3B}$$

$$= a^2 \frac{(27B^3 - 8B^3)}{3} + b^2 B + ab\left(9B^2 - 4B^2\right)$$

$$= \boxed{\frac{a^2}{3} 19B^3 + b^2 B + 5abB^2}$$



$X(t)$ e' un processo SSL

$$R_X(\tau) = E\left[X(t)\, X(t-\tau)\right]$$

$$R_Y(\tau) = E\left[Y(t)\, Y(t-\tau)\right]$$

$$R_Y(\tau) = E\Big[\underbrace{\int_{-\infty}^{+\infty} X(\alpha)\, h(t-\alpha)\, d\alpha}_{Y(t)} \cdot$$

$$\cdot \int_{-\infty}^{+\infty} X(\beta)\, h(\underline{t-\tau} - \beta)\, d\beta \Big]$$

$$\int_{\alpha} \int_{\beta} \underbrace{E\left[X(\alpha)\, X(\beta)\right]}_{\substack{R_X(\alpha-\beta)\\ SSL}} h(t-\alpha)\, h(t-\tau-\beta)\, d\alpha\, d\beta$$

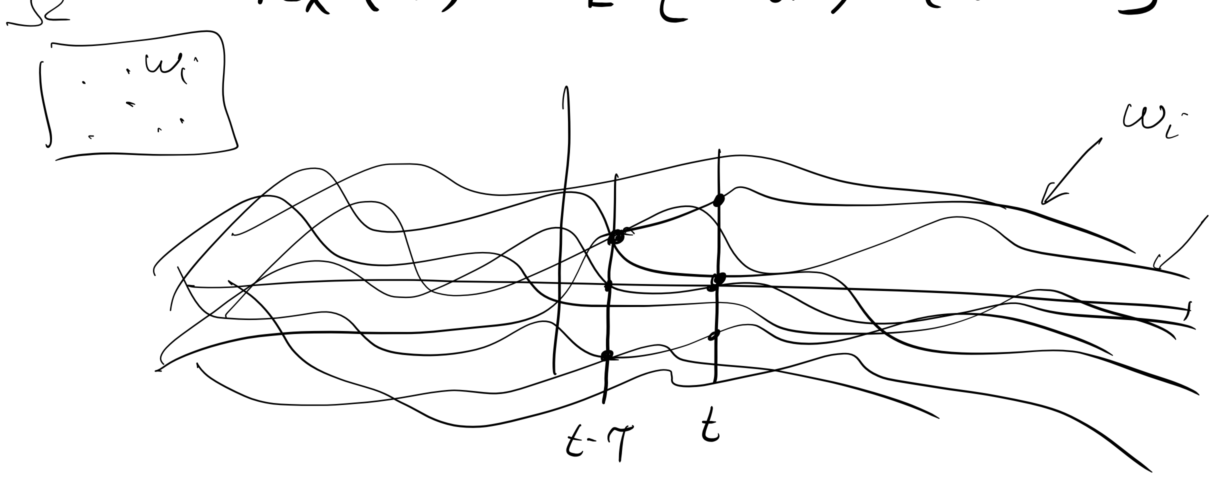
$$= R_X(\underset{\tau}{\alpha-\beta}) \otimes h(\underset{\tau}{\alpha-\beta}) \otimes h(\underset{-\tau}{\beta-\alpha})$$

$$= R_X(\tau) \otimes h(\tau) \otimes h(-\tau)$$

$$R_X(\underset{\alpha}{t_1}, \underset{\beta}{t_2}) \triangleq E\left[X(\underset{\alpha}{t_1})\, X(\underset{\beta}{t_2})\right] = R_X(\underset{\tau}{t_1 - t_2})$$

AUTOCORRELAZIONE DI UN PROCESSO SSL

$$R_X(\tau) = E\left[X(t)\, X(t-\tau)\right]$$

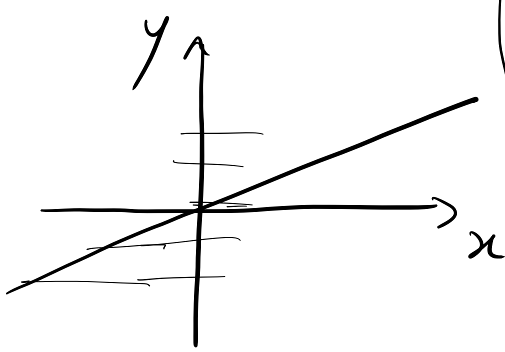


$$f_Y(y) = \sum_{i=1}^{N} \frac{f_X(x_i)}{|g'(x_i)|} = \frac{\frac{1}{\sqrt{2\pi\sigma^2}}\, e^{-\frac{y^2}{2a^2\sigma^2}}}{|a|}$$

$$= \frac{1}{\sqrt{2\pi}\,\sigma|a|}\, e^{-\frac{y^2}{2(a^2\sigma^2)}}$$

$$T[X] = Y$$

$$y = g(x) \qquad \sigma_y^2 = a^2\sigma^2$$



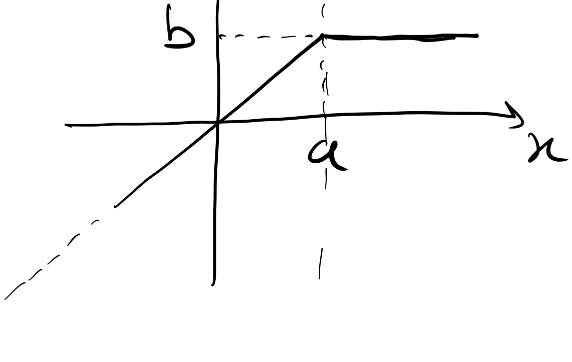
$$y = g(x) = a x$$

$$x_i = g^{-1}(y)$$

$$x = \frac{1}{a} y$$

$$f_X(x) = \frac{1}{\sqrt{2\pi\sigma^2}}\, e^{-\frac{x^2}{2\sigma^2}}$$

$$= \boxed{\frac{1}{\sqrt{2\pi\sigma_y^2}}\, e^{-\frac{y^2}{2\sigma_y^2}}}$$



$$y = g(x)$$

$$f_X(x) = \frac{1}{\sqrt{2\pi\sigma_x^2}}\, e^{-\frac{x^2}{2\sigma_x^2}}$$

$$g(x) = \begin{cases} \frac{b}{a} x & x \leq a \\ b & x \geq a \end{cases}$$

$$x_i = \begin{cases} g^{-1}(y) \Rightarrow x = \frac{a}{b} y & y \leq b \\ 0 & y > b \end{cases}$$

$f_Y(y)$ è mista → parte continua

→ massa di prob. in b

$$\boxed{A\,\delta(y-b)}$$

$$A = \int_a^{+\infty} f_X(x)\,dx = Q\left(\frac{a}{\sigma_x}\right)$$

$$Q(x) = \int_x^{+\infty} f_N(u)\,du$$

$$f_N(u) = \frac{1}{\sqrt{2\pi}} e^{-\frac{x^2}{2}}$$

$$\mathcal{N}(0,1)$$

$$f_Y^{(lin)}(y) = \frac{f_X\left(\frac{a}{b} y\right)}{\left|\frac{b}{a}\right|}$$

$$= \frac{\frac{1}{\sqrt{2\pi\sigma_x^2}} e^{-\frac{\left(\frac{a}{b}y\right)^2}{2\sigma_x^2}}}{\left|\frac{b}{a}\right|}$$

$$= \frac{1}{\sqrt{2\pi}\,\sigma_x\left|\frac{b}{a}\right|} e^{-\frac{y^2}{2\left(\sigma_x\left|\frac{b}{a}\right|\right)^2}}$$

$$\sigma_y^2 = \sigma_x^2\left|\frac{b}{a}\right|^2 = \sigma_x^2\frac{b^2}{a^2}$$

$$\begin{cases} f_Y(y) = \dfrac{1}{\sqrt{2\pi\sigma_Y^2}} e^{-\frac{y^2}{2\sigma_Y^2}} & y \leq b \\ Q\left(\dfrac{a}{\sigma_x}\right) \delta(y-b) & y = b \\ 0 & y > b \end{cases}$$