komplex

$$f(t) = \sum_{n=-\infty}^{\infty} c_n e^{\frac{2\pi i n t}{T}}$$

$$c_n = \frac{1}{T} \int_{-T/2}^{T/2} f(x)\, e^{\frac{-2\pi i n x}{T}}\, dx$$

f gerade / ungerade $\Rightarrow c_n = ?$

reell

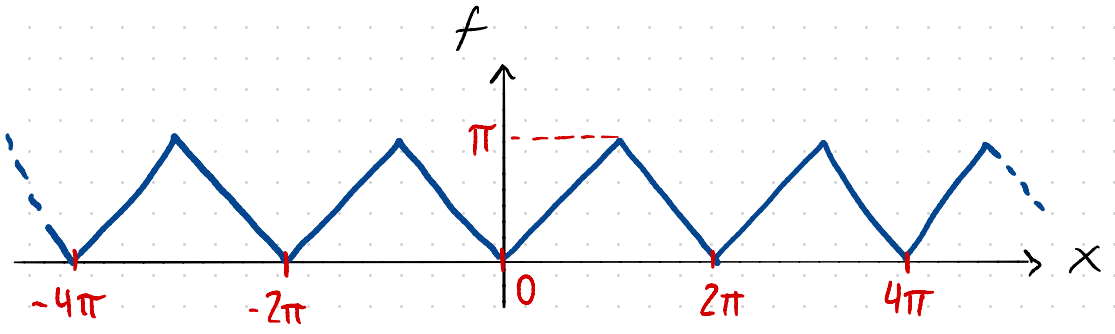
$$f(t) = \frac{a_0}{2} + \sum_{n=1}^{\infty} a_n \cos\left(\frac{2\pi n t}{T}\right) + b_n \sin\left(\frac{2\pi n t}{T}\right)$$

$$a_n = \frac{2}{T} \int_{-T/2}^{T/2} f(x) \cos\left(\frac{2\pi n x}{T}\right) dx \quad (n \geq 0)$$

$$b_n = \frac{2}{T} \int_{-T/2}^{T/2} f(x) \sin\left(\frac{2\pi n x}{T}\right) dx \quad (n \geq 1)$$

f gerade $\Rightarrow b_n = 0$, $a_n = 2 \int_0^{T/2} \dots$

f ungerade $\Rightarrow a_n = 0$, $b_n = 2 \int_0^{T/2} \dots$



$$c_n, a_n, b_n = \cdots \int_{-T/2}^{T/2} f(x)\, \text{trig}\left(\frac{2\pi}{T} n x\right) dx$$

exp, cos, sin

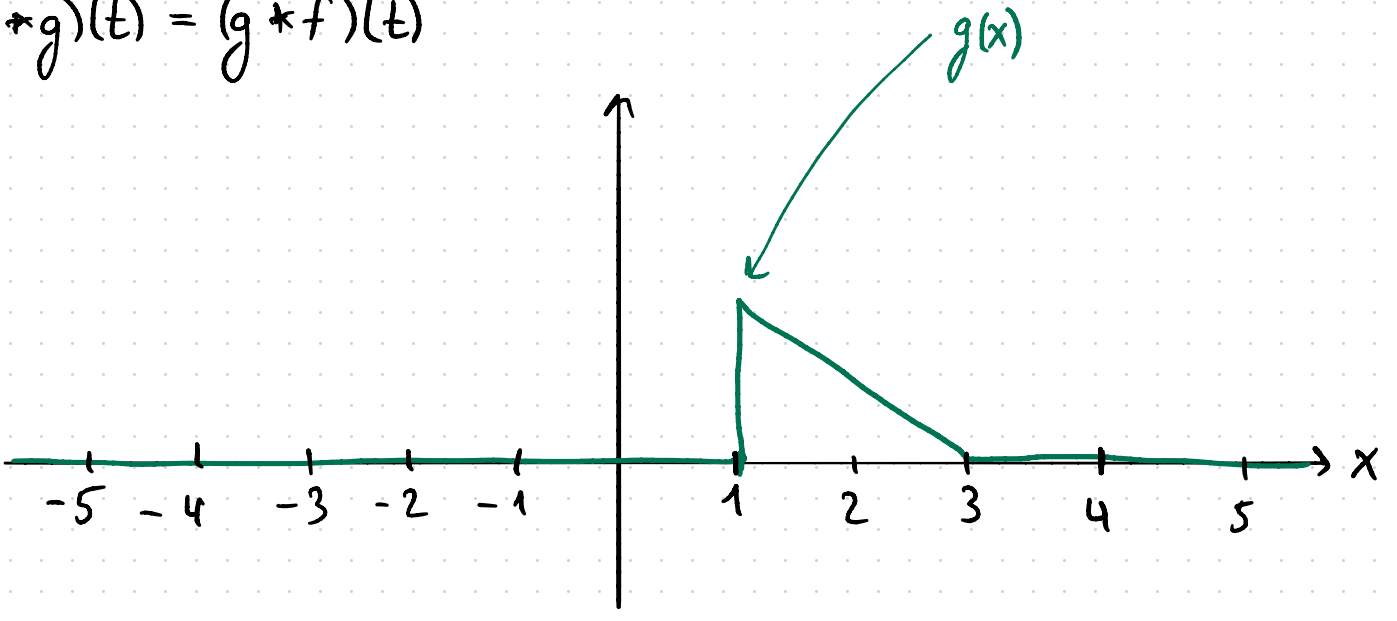
c_n a_n b_n

Faltung

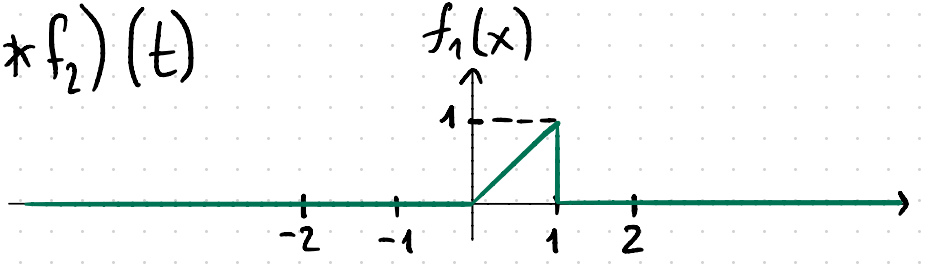
→ Funktional

$$(f * g)(t) = \int_{-\infty}^{\infty} f(\tau) g(t-\tau) d\tau$$

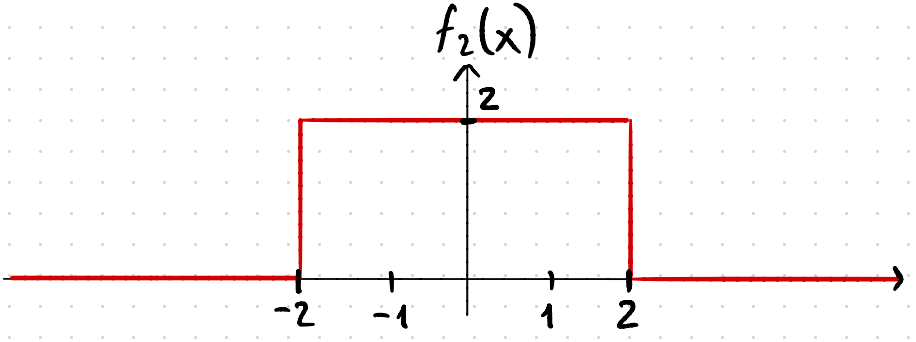
→ $(f * g)(t) = (g * f)(t)$



$(f_1 * f_2)(t)$



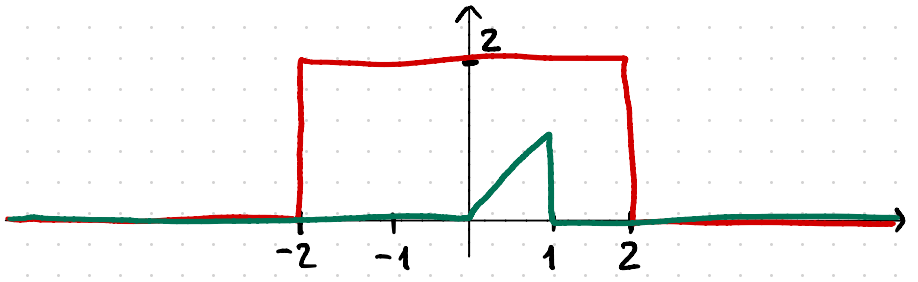
$$f_1(x) = \begin{cases} x, & 0 < x < 1 \\ 0, & \text{sonst} \end{cases}$$



$$f_2(x) = \begin{cases} 2, & |x| < 2 \\ 0, & \text{sonst} \end{cases}$$

$$(f * g)(t) = \int_{-\infty}^{\infty} f(\tau)\, g(t-\tau)\, d\tau$$

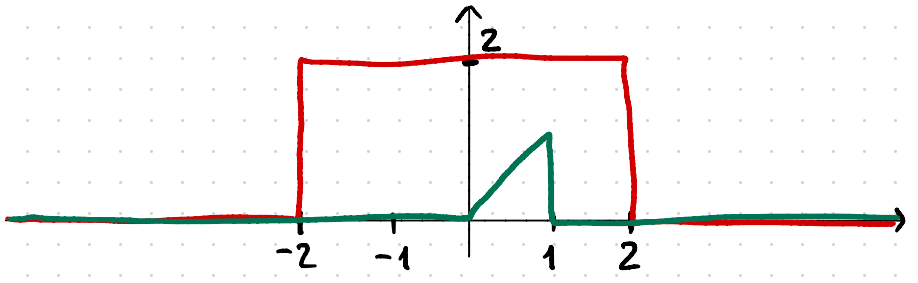
$$(f_1 * f_2)(t) = \begin{cases} & < t < \\ & < t < \\ & < t < \\ & < t < \\ & < t < \end{cases}$$



$g(t-x)$

$f(x)$

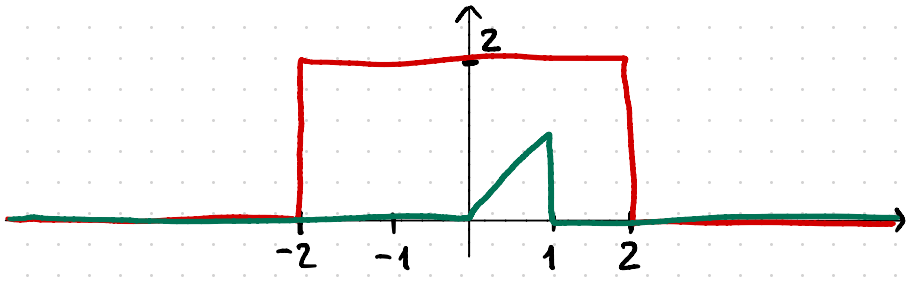
$$(f_1 * f_2)(t< \quad , t> \quad) = \int$$



$g(t-x)$

$f(x)$

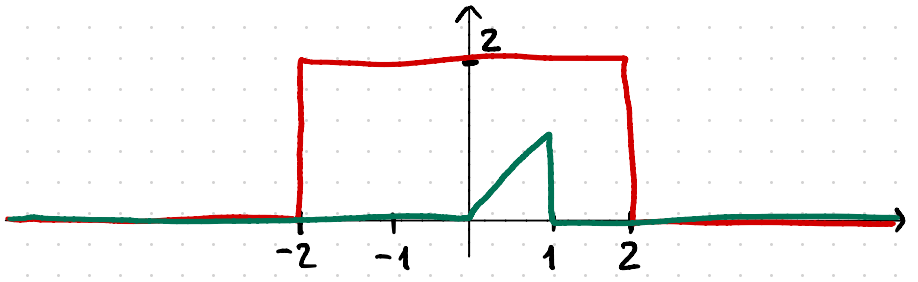
$(f_1 * f_2)(\quad < t < \quad) = \int$



$g(t-x)$

$f(x)$

$(f_1 * f_2)(\quad < t < \quad) = \int$



$g(t-x)$

$f(x)$

$(f_1 * f_2)(\quad < t < \quad) = \int$