$\dim V = n < \infty$

$v = a_1 u_1 + \dots + a_n u_n$

pro bázi $\underline{u}$

$\underline{u} : V \longrightarrow \mathbb{R}^n$

měření a_i .. typické lineární forma e^i

$f = f_1 e^1 + \dots + f_n e^n$

$\langle f, v \rangle = f^T \cdot a$

$\varphi : V \longrightarrow W$

$\Updownarrow$

matice $\quad x \mapsto A \cdot x$

"funkce", tj. $\dim = \infty$

$\mathcal{C}[a,b]$ .. po částech spojité

"souřadnice"? (do jisté míry koef. v Fourierově řadě)

$L : \mathcal{C}[a,b] \longrightarrow \mathbb{R}$ lineární

(např. $f \mapsto \underbrace{f(0) + f'''(1) - f^{(10)}(0)}_{\in \mathbb{R}}$)

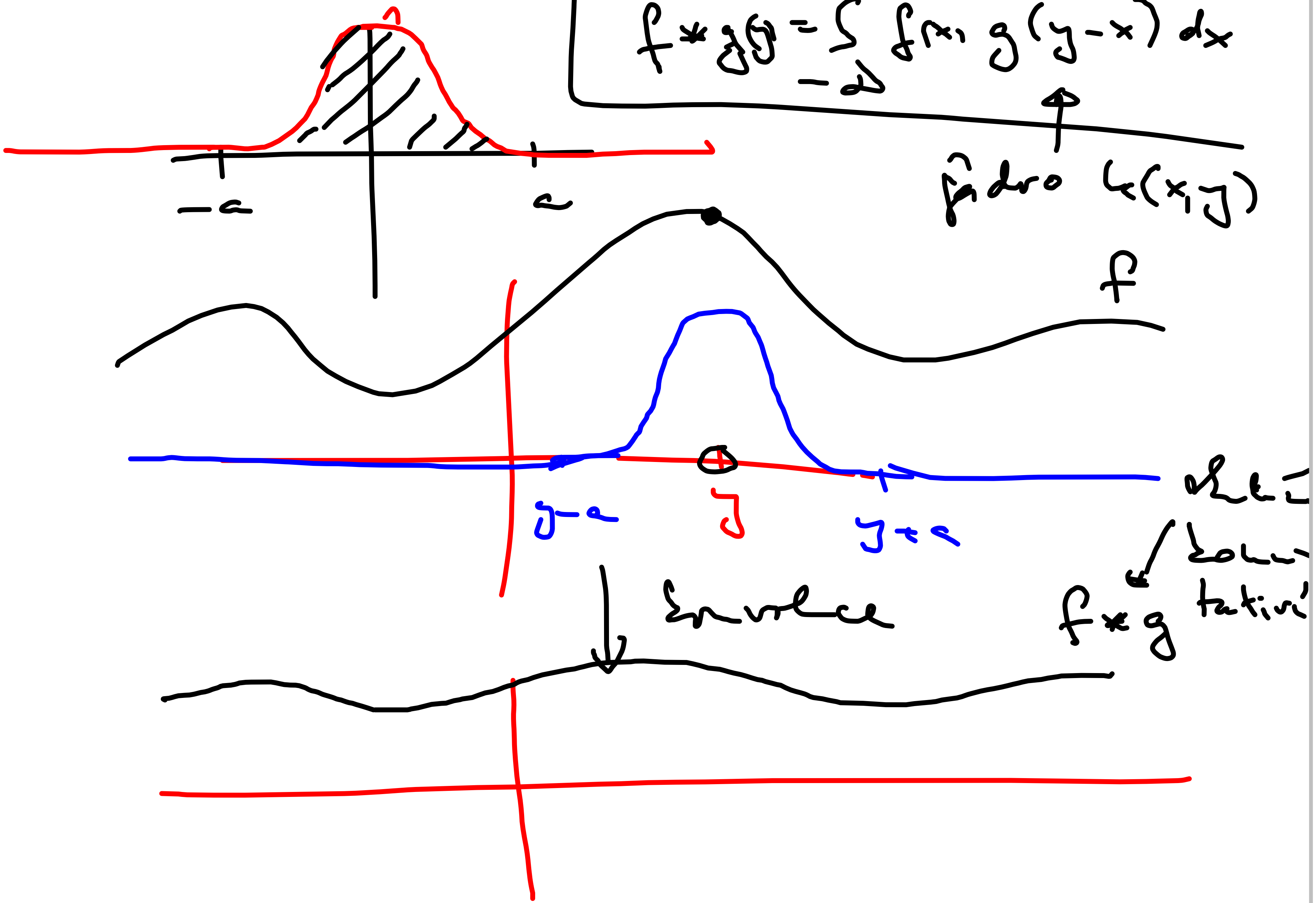
$\mathcal{C}[-1,2]$

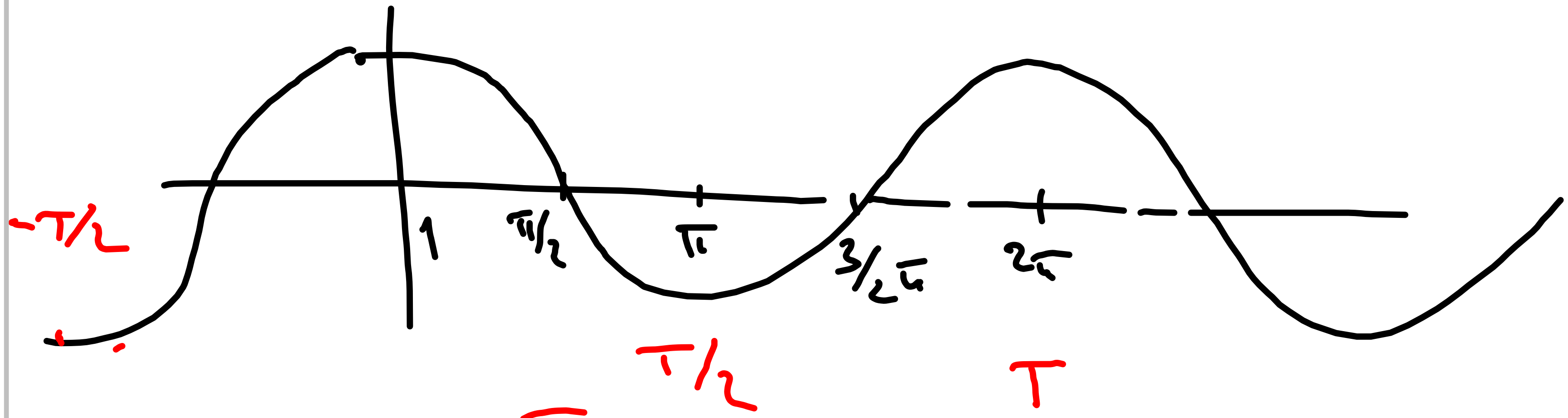
$L(f_1 + f_2) = \int_a^b (f_1(x) + f_2(x))\, g(x)\, dx$

$= \int_a^b f_1(x) g(x)\, dx + \int_a^b f_2(x) g(x)\, dx$

$$f*g(y) = \int_{-\infty}^{\infty} f(x)\, g(y-x)\, dx$$

jádro $k(x,y)$





$$a_n = \frac{1}{2\pi}\int_{-\pi}^{\pi} f(t)\cos nt\,dt$$ ← standard ve Four. ř.

$$= \frac{1}{T}\int_{-T/2}^{T/2} f(t)\cos \omega n t\,dt$$

$$c_n = \frac{1}{T}\int_{-T/2}^{T/2} f(t)\, e^{-i\omega n t}\,dt$$

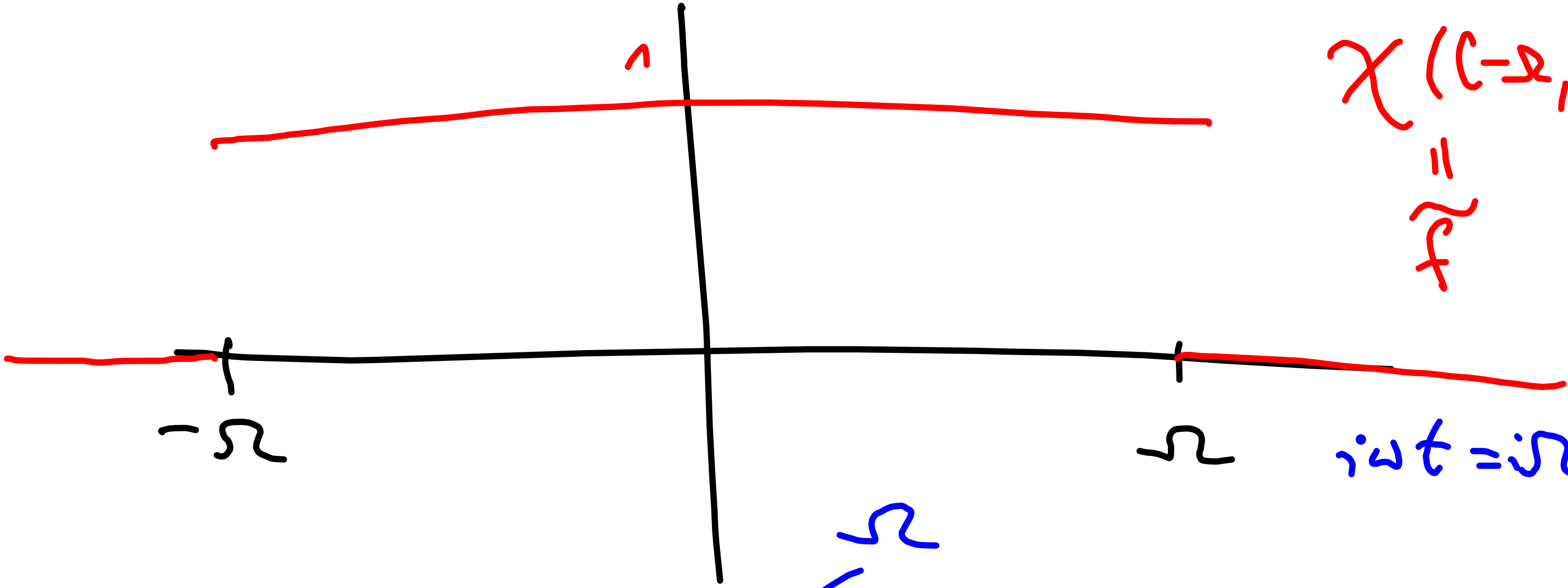
$$\boxed{\Delta\omega = 2\pi/T}$$

$$\tilde{f}(\omega) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} f(t)\, e^{-i\omega t}\, dt$$

$$f(\omega) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} \tilde{f}(t)\, e^{i\omega t}\, dt.$$

$$\widetilde{(f * g)} = \sqrt{2\pi}\; \tilde{f} \cdot \tilde{g}$$

$$g \;\downarrow\; \text{fce } \delta \qquad\qquad \tilde{g} \;\downarrow\; 1$$



$$\chi((-\Omega,\Omega)) = \tilde{f}$$

$i\omega t = i\Omega t$

$$\mathcal{F}^{-1}(\tilde{f}) = \frac{1}{\sqrt{2\pi}} \int_{\cancel{-\infty}\,-\Omega}^{\cancel{\infty}\,\Omega} \cancel{\tilde{f}(\omega)}\, e^{i\omega t}\, d\omega = \left[\begin{array}{l} i\omega t = s \\ t\, d\omega = ds \end{array}\right]$$

$$= \frac{1}{\sqrt{2\pi}} \cdot \frac{1}{it} \int_{-i\Omega t}^{+i\Omega t} e^{s}\, ds = \ldots = \frac{2}{\sqrt{2\pi}} \frac{\sin(\Omega t)}{t}$$

$$h(t) = \int_{-\infty}^{\infty} f(x, g(t-x))\,dx$$

$$\tilde{h}(\omega) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} h(t)\, e^{-i\omega t}\, dt$$

Resumé :

F ... veličina závislé na "parametru" (= nezávislé pohromé)

nedůležité jsme : F(A) .. funkce závislé na matici

$$e^X = \sum_{n=0}^{\infty} \frac{1}{n!} X^n$$

(X .. čtvercová matice)

$$e^{tX}$$

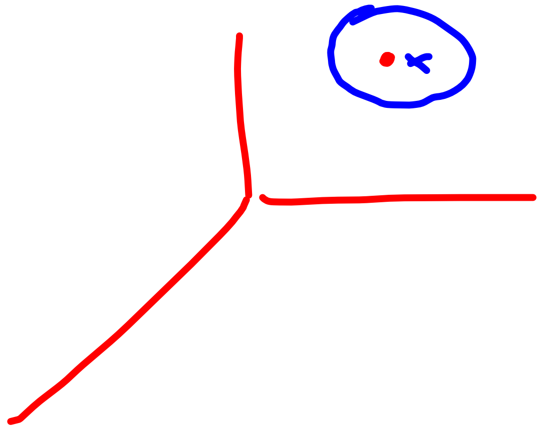
Cauchyovské posloupnosti $\Rightarrow \mathbb{R}$

$|u_m - u_n| < \varepsilon$ pro velká m, n

$(\varepsilon > 0)$

$\|w - x\| < \varepsilon$

topologie $\mathbb{R}$



Taylor:

lineární přiblížení — kvadratické přiblížení

$$f(x+\delta) = f(x) + Df(x)(\delta) + \frac{1}{2} D^2 f(x)(\delta,\delta) + \dots + \frac{1}{n!} D^n f(x+\xi)(\delta, \dots, \delta)$$

$f: \mathbb{R} \to \mathbb{R}$

$$Df(x) = (f'(x))$$

$$Df(x)(\delta) = f'(x) \cdot \delta$$

$$D^2 f(x)(\delta,\delta) = f''(x) \cdot \delta^2$$

$f: \mathbb{R}^2 \to \mathbb{R}$

$$Df = (D_x f, D_y f)$$

$\delta \in \mathbb{R}^2$

$x \in \mathbb{R}^2$

$$Df(x)(\delta)$$

$$(\delta)^T (D^2 f(x))(\delta) = D^2 f(x)(\delta,\delta)$$