FOURIEROV RED

INTERVAL

SIMETRIČAN

NESIMETRIČAN

↓

PARNOST

PARNA

$$a_0 = \frac{2}{L}\int_0^L f(x)\,dx$$

$$a_n = \frac{2}{L}\int_0^L f(x)\cos\left(\frac{n\pi x}{L}\right)dx$$

$$b_n = 0$$

NEPARNA

$$a_0 = 0$$

$$a_n = 0$$

$$b_n = \frac{2}{L}\int_0^L f(x)\sin\left(\frac{n\pi x}{L}\right)dx$$

NESIMETRIČNA = NI PARNA NI NEPARNA

$$a_0 = \frac{2}{T}\int_0^T f(x)\,dx$$

$$a_n = \frac{2}{T}\int_0^T f(x)\cos\left(\frac{2n\pi x}{T}\right)dx$$

$$b_n = \frac{2}{T}\int_0^T f(x)\sin\left(\frac{2n\pi x}{T}\right)dx$$

PERSEVALOVA

$$\frac{a_0^2}{2} + \sum a_n^2 + \sum b_n^2 = \frac{2}{T}\int_a^b |f(x)|^2 dx$$

FOURIEROV INT

PARNA:

$$A(\lambda) = \frac{2}{\pi}\int_0^\infty f(x)\cos(\lambda x)\,dx$$

$$B(\lambda) = 0$$

$$\boxed{f(x) = \int_0^\infty A(\lambda)\cdot\cos(\lambda x)\,d\lambda}$$

NEPARNA:

$$A(\lambda) = 0$$

$$B(\lambda) = \frac{2}{\pi}\int_0^\infty f(x)\sin(\lambda x)\,dx$$

$$\boxed{f(x) = \int_0^\infty B(\lambda)\sin(\lambda x)\,d\lambda}$$

NI PARNA NI NEPARNA

$$A(\lambda) = \frac{2}{\pi}\int_0^\infty f(x)\cos(\lambda x)\,dx$$

$$f(x) = \int_0^\infty \left[A(\lambda)\cos(\lambda x) + B(\lambda)\sin(\lambda x)\right] d\lambda$$

$$B(\lambda) = \frac{2}{\pi}\int_0^\infty f(x)\sin(\lambda x)\,dx$$

LAPLACE

$$F(s) = \int_0^{\infty} e^{-st} f(t)\, dt$$

$\downarrow$ [illegible] $\qquad\qquad \hookrightarrow$ ORIG.

$$e^{-as} \circ\!\!-\!\!\!-\!\!\bullet \frac{1}{s+a}$$

$$u(t) \circ\!\!-\!\!\!-\!\!\bullet \frac{1}{s}$$

$$t^n \circ\!\!-\!\!\!-\!\!\bullet \frac{n!}{s^{n+1}}$$

$$\sin(\omega t) \circ\!\!-\!\!\!-\!\!\bullet \frac{\omega}{s^2+\omega^2}$$

$$\cos(\omega t) \circ\!\!-\!\!\!-\!\!\bullet \frac{s}{s^2+\omega^2}$$

$$\mathrm{sh}(\omega t) \circ\!\!-\!\!\!-\!\!\bullet \frac{\omega}{s^2-\omega^2}$$

$$\mathrm{ch}(\omega t) \circ\!\!-\!\!\!-\!\!\bullet \frac{s}{s^2-\omega^2}$$

$$e^{-at} f(t) \circ\!\!-\!\!\!-\!\!\bullet F(s+a)$$

$$f(t-a)\,u(t-a) \circ\!\!-\!\!\!-\!\!\bullet e^{-as} F(s)$$

$$t^n f(t) \circ\!\!-\!\!\!-\!\!\bullet (-1)^n F^{(n)}(s)$$

$$\frac{f(t)}{t} \circ\!\!-\!\!\!-\!\!\bullet \int_0^{\infty} F(s)\, ds$$

$$\int_0^t f(\tau)\, d\tau \circ\!\!-\!\!\!-\!\!\bullet \frac{F(s)}{s}$$

$$f^{(n)}(t) \circ\!\!-\!\!\bullet\ s^n Y(s) - s^{n-1} y(0) - s^{n-2} y'(0) - \dots - y(0)$$

$$F(s) = \frac{1}{1-e^{-sT}} \int_0^T e^{-st} f(t)\,dt \quad , \quad T - \text{period}$$

$$(f_1 * f_2)(t) = \int_0^t f_1(\tau) f_2(t-\tau)\,d\tau \circ\!\!-\!\!\bullet\ F_1(s)\, F_2(s)$$

$$R \circ\!\!-\!\!\bullet\ R$$

$$L \circ\!\!-\!\!\bullet\ sL$$

$$C \circ\!\!-\!\!\bullet\ \frac{1}{sC}$$

$$\begin{tikzcd}
e^{-at} f(t) u(t-b) \arrow[r, "\circ\!\!-\!\!\bullet"] \arrow[d] & F(s+a)\, e^{-b(s+a)} \\
f(t) u(t-b) \arrow[r, "\circ\!\!-\!\!\bullet"] \arrow[d] & F(s)\, e^{-bs} \arrow[u] \\
f(t) \circ\!\!-\!\!\bullet\ F(s) \arrow[ur] &
\end{tikzcd}$$