

Na $(-l, l)$

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

$$a_n = \frac{1}{l} \int_{-l}^l f(x) \cos \frac{n\pi x}{l} dx; \quad b_n = \frac{1}{l} \int_{-l}^l f(x) \sin \frac{n\pi x}{l} dx$$

$n=0,1,2,\dots$

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a) Ako je $f(x)$ **parna** funkcija onda je $b_n=0$, i $a_n = \frac{2}{l} \int_0^l f(x) \cos \frac{n\pi x}{l} dx$; $n=0,1,2,\dots$

b) Ako je $f(x)$ **neparna** funkcija onda je $a_n=0$ i $b_n = \frac{2}{l} \int_0^l f(x) \sin \frac{n\pi x}{l} dx$ $n=1,2,3,\dots$

Ako je $f(x)$ **periodična funkcija sa periodom $2l$** , onda Furijeove koeficijente računamo:

$$a_n = \frac{1}{l} \int_t^{t+2l} f(x) \cos \frac{n\pi x}{l} dx, \quad n=0,1,2,\dots \quad i \quad b_n = \frac{1}{l} \int_t^{t+2l} f(x) \sin \frac{n\pi x}{l} dx \quad n=1,2,\dots$$

gde je t - proizvoljan broj

Ako razvijamo na intervalu $[a,b]$

$$a_0 = \frac{2}{b-a} \int_a^b f(x) dx; \quad a_n = \frac{2}{b-a} \int_a^b f(x) \cos \frac{2n\pi x}{b-a} dx; \quad b_n = \frac{2}{b-a} \int_a^b f(x) \sin \frac{2n\pi x}{b-a} dx;$$

REŠENJA NEKIH INTEGRALA (zbog brzine u radu)

$$\int_{-\pi}^{\pi} \sin nx dx = 0; \quad \int_{-\pi}^{\pi} \cos nx dx = 0; \quad \int_{-\pi}^{\pi} \cos nx \sin mx dx = 0; \quad \int_{-\pi}^{\pi} \cos nx \cos mx dx = 0$$

$$\int_{-\pi}^{\pi} \sin nx \sin mx dx = 0; \quad \int_{-\pi}^{\pi} \cos^2 nx dx = \pi; \quad \int_{-\pi}^{\pi} \sin^2 nx dx = \pi$$

PROBLEM KAD TREBA DODEFINISATI FUNKCIJU :

Primer1:

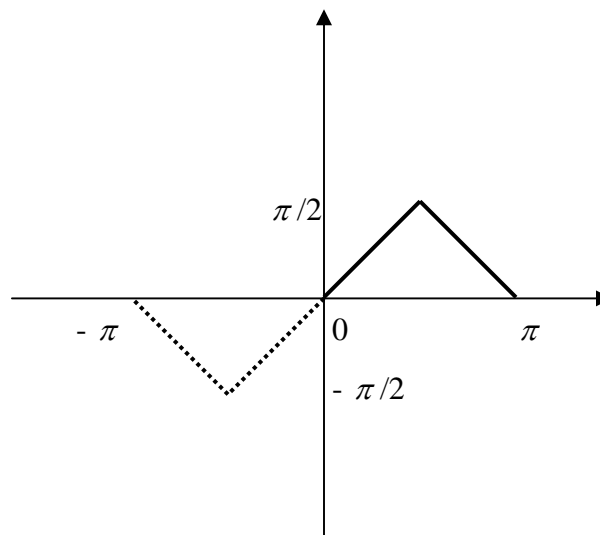
$$\text{Funkciju } f(x) = \begin{cases} x, & x \in [0, \frac{\pi}{2}] \\ -x + \pi, & x \in (\frac{\pi}{2}, \pi] \end{cases}$$

razviti u red po sinusima.

dodefinisanje je:

$$F(x) = \begin{cases} -x + \pi, & x \in (\frac{\pi}{2}, \pi] \\ x, & x \in [-\frac{\pi}{2}, \frac{\pi}{2}] \\ -x - \pi, & x \in [-\pi, -\frac{\pi}{2}) \end{cases}$$

funkcija je **neparna**.



Primer 2:

$$\text{Funkciju } f(x) = \begin{cases} x, & x \in (0,1) \\ 2-x, & x \in [1,2] \end{cases}$$

razviti u red po kosinusima.

dodefinisanje je:

$$F(x) = \begin{cases} x+2, & x \in [-2,-1] \\ |x|, & x \in (-1,1) \\ x-2, & x \in [1,2] \end{cases}$$

funkcija je **parna**.

