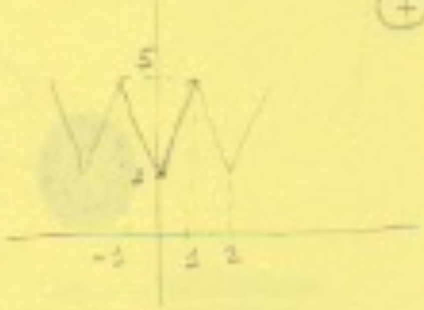
Es. 6 $\quad f(x) = 3x+2 \quad x \in [0,1] \quad$ pari



f pari $\Rightarrow b_k = 0 \quad \forall k = 1,2,3,\dots$

$$a_0 = \frac{2}{T}\int_0^T f(x)\,dx = \int_{-1}^{1} f(x)\,dx = 2\int_0^1 (3x+2)\,dx$$

$$= 2\left(\frac{3}{2}+2\right) = 7 \qquad \omega = \frac{2\pi}{T} = \frac{2\pi}{2} = \pi$$

$$a_k = \frac{2}{T}\int_0^T \cos(k\omega x) f(x)\,dx = \int_{-1}^{1} \cos(k\omega x) f(x)\,dx =$$

$$= 2\int_0^1 \cos(k\omega x)(3x+2)\,dx = 2\left[\frac{1}{k\omega}\sin(k\omega x)(3x+2)\Big|_0^1 - \frac{1}{k\omega}\int_0^1 \sin(k\omega x)\,3\,dx\right]$$

$$= -\frac{2}{k\omega}\cdot 3\,\frac{1}{k\omega}\left(-\cos(k\omega x)\right)\Big|_0^1 = \frac{6}{(k\omega)^2}\cos(k\omega x)\Big|_0^1 = \frac{6}{(k\pi)^2}\left[(-1)^k - 1\right]$$

$$f(x) \sim \frac{7}{2} + \frac{6}{\pi^2}\sum_{k=1}^{\infty} \frac{(-1)^k - 1}{k^2}\cos(k\pi x)$$

$f(x)$ è una funzione regolare a tratti, continua

$\Rightarrow$ la serie converge puntualmente ad $f(x)$ $\forall x \in \mathbb{R}$

$$\left|\frac{(-1)^k - 1}{k^2}\cos(k\pi x)\right| \le \frac{2}{k^2} \qquad \sum_k \frac{2}{k^2} < +\infty$$

$\Rightarrow$ la serie converge totalmente $\mathbb{R}$

$f'(x)$ non è continua in $[0,T]$ $\Rightarrow$ la serie non è derivabile termine a termine.