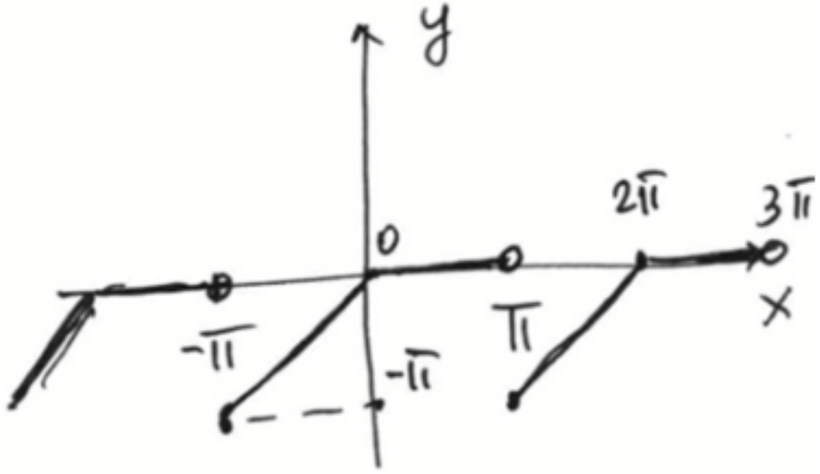
SOLUTIONS

1. (14 points) Let $f(x)$ be defined by $f(x) = \begin{cases} x, & -\pi \le x < 0 \\ 0, & 0 \le x < \pi \end{cases}$ and extended with period 2π to all of $\mathbb{R}$.

   (a) Find the Fourier series of f.

$$f(x) \sim a_0 + \sum_{k=1}^{\infty} a_k \cos(kx) + b_k \sin(kx)$$



$$a_0 = \frac{1}{2\pi}\int_{-\pi}^{\pi} f(x)\,dx = \frac{1}{2\pi}\int_{-\pi}^{0} x\,dx$$

$$= \frac{1}{2\pi}\cdot\frac{1}{2}x^2\Big|_{-\pi}^{0} = \frac{1}{4\pi}(0-\pi^2) = \boxed{\frac{-\pi}{4}}$$

$$a_k = \frac{1}{\pi}\int_{-\pi}^{\pi} f(x)\cos(kx)\,dx = \frac{1}{\pi}\int_{-\pi}^{0} x\cos(kx)\,dx = \frac{1}{\pi k}\int_{-\pi}^{0} x\,d\sin(kx)$$