

1) Compute the Fourier series for the function:

$$f(x) = \begin{cases} \sin x, & 0 \leq x < \pi \\ 0, & -\pi < x < 0 \end{cases}$$

Deduce that

$$\sum_{n=0}^{\infty} \frac{(-1)^{n+1}}{(2n-1)(2n+1)} = \frac{\pi}{4}.$$

2) Obtain the Fourier series for the function

$$g(x) = |x| - x, \quad -3 < x < 3.$$