

5. Find the odd Fourier extension of  $f(x)$ ,  $0 < x < \pi$ , where

$$f(x) = \begin{cases} 1 & 0 < x < \frac{\pi}{2} \\ \frac{1}{2} & \frac{\pi}{2} < x < \pi \end{cases}$$

Ans.  $f(x) = \frac{2}{\pi} \sum_{n=1,3,5,\dots} \frac{1}{n} \left( 1 + \frac{(-1)^{n+1}}{2} - \frac{1}{2} \cos \frac{n\pi}{2} \right) \sin nx$