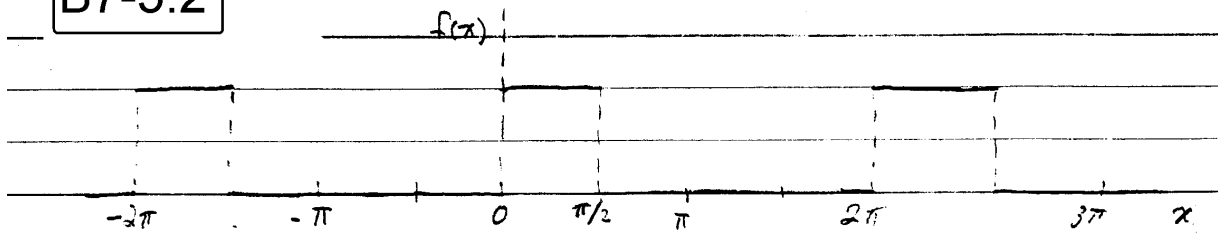


B7-5.2



Period = 2π Use equations 5.9 & 5.10

$$a_n = \frac{1}{\pi} \int_{-\pi}^{\pi} f(x) \cos nx \, dx = \frac{1}{\pi} \int_0^{\pi/2} \cos nx \, dx = \frac{1}{n\pi} \sin nx \Big|_0^{\pi/2}$$

$$= \frac{1}{n\pi} \sin\left(\frac{n\pi}{2}\right) = \begin{cases} 0, & n \neq 0 \text{ or even} \\ \frac{1}{n\pi}, & n = 1, 5, 9, \dots \\ -\frac{1}{n\pi}, & n = 3, 7, 11, \dots \end{cases}$$

$$a_0 = \frac{1}{\pi} \int_0^{\pi/2} dx = \frac{1}{2} \quad \text{so} \quad \frac{1}{2} a_0 = \frac{1}{4}$$

$$b_n = \frac{1}{\pi} \int_0^{\pi/2} \sin nx \, dx = -\frac{1}{n\pi} \cos nx \Big|_0^{\pi/2} = \frac{-1}{n\pi} [\cos \frac{n\pi}{2} - 1]$$

$$b_n = \begin{cases} 1/n\pi, & n \text{ odd} \\ 2/n\pi, & n = 2, 6, 10, \dots \\ 0, & n = 4, 8, 12, \dots \end{cases}$$

$$\text{Hence } f(x) = \frac{1}{4} + \frac{1}{\pi} \left[\frac{\cos x}{1} - \frac{\cos(3x)}{3} + \frac{\cos(5x)}{5} \right.$$

$$\left. + \frac{\sin x}{1} + 2 \frac{\sin 2x}{2} + \frac{\sin 3x}{3} + \right.$$

$$\left. + \frac{\sin 5x}{5} + 2 \frac{\sin 6x}{6} + \dots \right]$$