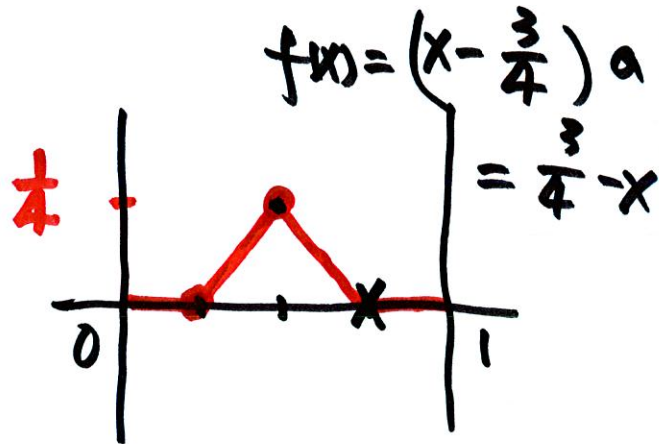


#11 on p552

$$f(x) = \begin{cases} 0, & x \in [0, \frac{1}{4}] \\ x - \frac{1}{4}, & x \in [\frac{1}{4}, \frac{1}{2}] \\ \frac{3}{4} - x, & x \in [\frac{1}{2}, \frac{3}{4}] \\ 0, & x \in [\frac{3}{4}, 1] \end{cases}$$



$$f(x) = a(x - \frac{1}{4}) \\ = x - \frac{1}{4}$$

$$B_n = 2 \int_0^1 f(x) \sin(n\pi x) dx$$

$$= 2 \left[ \int_{\frac{1}{4}}^{\frac{1}{2}} (x - \frac{1}{4}) \sin(n\pi x) dx + \int_{\frac{1}{2}}^{\frac{3}{4}} (\frac{3}{4} - x) \sin(n\pi x) dx \right]$$

$$u = x - \frac{1}{4}, \quad \frac{3}{4} - x; \quad v' = \sin(n\pi x)$$

$$u' = 1, \quad -1; \quad v = -\frac{\cos(n\pi x)}{n\pi}$$

$$= 2 \left[ -\left(x - \frac{1}{4}\right) \frac{\cos(n\pi x)}{n\pi} \Big|_{\frac{1}{4}}^{\frac{1}{2}} + \frac{\sin(n\pi x)}{(n\pi)^2} \Big|_{\frac{1}{4}}^{\frac{1}{2}} - \left(\frac{3}{4} - x\right) \frac{\cos(n\pi x)}{n\pi} \Big|_{\frac{1}{2}}^{\frac{3}{4}} - \frac{\sin(n\pi x)}{(n\pi)^2} \Big|_{\frac{1}{2}}^{\frac{3}{4}} \right]$$

$$= 2 \left[ -\frac{1}{4} \frac{\cos \frac{n\pi}{2}}{n\pi} + \frac{1}{4} \frac{\cos \frac{n\pi}{2}}{n\pi} + \frac{1}{(n\pi)^2} \left\{ \sin \frac{n\pi}{2} - \sin \frac{n\pi}{4} - \sin \frac{3n\pi}{4} + \sin \frac{n\pi}{2} \right\} \right]$$

$$= \frac{2}{(n\pi)^2} \left[ 2 \sin \frac{n\pi}{2} - \sin \frac{n\pi}{4} - \sin \frac{3n\pi}{4} \right]$$