7(a) $f(x) = \begin{cases} x, & 0 < x \le \pi \\ 2\pi - x, & \pi < x \le 2\pi \end{cases}$ $[0, 2\pi]$

$$b_n = \frac{2}{2\pi}\int_0^{2\pi} f(x)\sin\left(\frac{n\pi x}{2\pi}\right)dx \quad 1$$

$$= \frac{1}{\pi}\left\{\int_0^{\pi} x\sin\left(\frac{nx}{2}\right)dx + 2\pi\int_{\pi}^{2\pi}\sin\left(\frac{nx}{2}\right)dx - \int_{\pi}^{2\pi} x\sin\left(\frac{nx}{2}\right)dx\right\} \quad 2$$

$$= \frac{1}{\pi}\left\{\left[\frac{4}{n^2}\sin\left(\frac{nx}{2}\right) - x\cdot\frac{2}{n}\cos\left(\frac{nx}{2}\right)\right]_0^{\pi} + 2\pi\left[-\frac{2}{n}\cos\left(\frac{nx}{2}\right)\right]_{\pi}^{2\pi}\right.$$

$$\left. - \left[\frac{4}{n^2}\sin\left(\frac{nx}{2}\right) - x\frac{2}{n}\cos\left(\frac{nx}{2}\right)\right]_{\pi}^{2\pi}\right\} \quad 4$$

$$= \frac{1}{\pi}\left\{\frac{4}{n^2}\sin\left(\frac{n\pi}{2}\right) - \frac{2\pi}{n}\cos\left(\frac{n\pi}{2}\right) - \frac{4\pi}{n}\cos(n\pi)\right.$$

$$+ \frac{4\pi}{n}\cos\left(\frac{n\pi}{2}\right) - \frac{4}{n^2}\sin(n\pi) + \frac{4\pi}{n}\cos(n\pi)$$

$$\left. + \frac{4}{n^2}\sin\left(\frac{n\pi}{2}\right) - \frac{2\pi}{n}\cos\left(\frac{n\pi}{2}\right)\right\}$$

$$= \frac{1}{\pi}\left\{\frac{8}{n^2}\sin\left(\frac{n\pi}{2}\right) - \frac{4}{n^2}\sin(n\pi)\right\} = \frac{8}{\pi n^2}\sin\left(\frac{n\pi}{2}\right) \quad 5$$

$$= \frac{8}{\pi n^2}(-1)^m \quad \text{if} \quad n = 2m+1, \quad m = 1, 2, 3, \ldots \quad 1$$

$$= 0 \quad \text{otherwise}$$

$$f(x) = \sum_{n=1}^{\infty} b_n \sin\left(\frac{nx}{2}\right) = \frac{8}{\pi}\sum_{n=1}^{\infty}\frac{\sin(n\pi/2)}{n^2}\sin\left(\frac{nx}{2}\right) \quad 1$$