$$A_0 = \frac{1}{L}\int_{-L}^{L} f(x)\,dx = \frac{1}{2}\int_{-2}^{2} f(x)\,dx = \frac{1}{2}\left(\int_{-1}^{0}(1+x)\,dx + \int_{0}^{1}(1-x)\,dx\right)$$

$$= \frac{1}{2}\left[x+\frac{x^2}{2}\right]_{-1}^{0} + \frac{1}{2}\left[x-\frac{x^2}{2}\right]_{0}^{1} = \frac{1}{2}\left(1-\frac{1}{2}+1-\frac{1}{2}\right) = \boxed{\frac{1}{2}}$$

$$A_n = \frac{1}{L}\int_{-L}^{L} f(x)\cos\left(\frac{n\pi x}{L}\right)dx = \frac{1}{2}\left(\int_{-1}^{0}(1+x)\cos\left(\frac{n\pi x}{2}\right)dx + \int_{0}^{1}(1-x)\cos\left(\frac{n\pi x}{2}\right)dx\right)$$

$$= \frac{1}{2}\left(\int_{-1}^{0}\cos\left(\frac{n\pi x}{2}\right)dx + \int_{-1}^{0}x\cos\left(\frac{n\pi x}{2}\right)dx + \int_{0}^{1}\cos\left(\frac{n\pi x}{2}\right) - \int_{0}^{1}x\cos\left(\frac{n\pi x}{2}\right)dx\right) =$$

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

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

$$= \frac{4-4\cos\left(\frac{n\pi}{2}\right)}{n^2\pi^2} = \boxed{\frac{8\sin^2\left(\frac{n\pi}{2}\right)}{n^2\pi^2}}$$

$$B_n = \frac{1}{L}\int_{-L}^{L} f(x)\sin\left(\frac{n\pi x}{L}\right)dx$$

$$= \frac{1}{2}\left(\int_{-1}^{0}\sin\left(\frac{n\pi x}{2}\right)dx + \int_{-1}^{0}x\sin\left(\frac{n\pi x}{2}\right)dx + \int_{0}^{1}\sin\left(\frac{n\pi x}{2}\right)dx - \int_{0}^{1}x\sin\left(\frac{n\pi x}{2}\right)dx\right)$$

$$= \frac{1}{2}\left(-\frac{4\sin^2\left(\frac{n\pi}{2}\right)}{\pi n} + \frac{4\sin\left(\frac{\pi n}{2}\right) - 2\pi n\cos\left(\frac{\pi n}{2}\right)}{\pi^2 n^2} + \frac{4\sin^2\left(\frac{\pi n}{2}\right)}{\pi n} - \frac{4\sin\left(\frac{\pi n}{2}\right) - 2\pi n\cos\left(\frac{\pi n}{2}\right)}{\pi^2 n^2}\right) = \boxed{0}$$