Now, these coefficients can be used to evaluate the fourier Series Representation.

$$x(t) = \sum_{-\infty}^{\infty} x[k] e^{jk\frac{2\pi}{T}t}$$

$$x[k] = \frac{1}{T}\int_T x(t) e^{-jk\frac{2\pi}{T}t}$$

$$x[k] = \frac{1}{8}\int_{-4}^{4} \left(\delta(t+1) + \delta(t-1)\right) e^{-jk\frac{2\pi}{T}t}\, dt$$

$$\boxed{x(t) = \sum_{-\infty}^{\infty} \frac{1}{4}\cos\left(\frac{2k\pi}{T}\right) e^{jk\frac{2\pi}{T}t}}$$

$$x[k] = \frac{1}{8}\left[e^{-jk\frac{2\pi}{T}(-1)} + e^{-jk\frac{2\pi}{T}(1)}\right]$$

$$= \frac{1}{8}\left[e^{jk\frac{2\pi}{T}} + e^{-jk\frac{2\pi}{T}}\right]$$

$$\boxed{x[k] = \frac{1}{4}\cos\left(\frac{2k\pi}{T}\right)}$$

Hence using $x[k]$ Fourier series Representation of $x(t)$ is written as

$$x(t) = \sum_{-\infty}^{\infty} x[k] e^{jk\frac{2\pi}{T}t} \qquad \boxed{x(t) = \sum_{-\infty}^{\infty} \frac{1}{4}\cos\left(\frac{k2\pi}{8}\right) e^{jk\frac{2\pi}{8}t}}$$

By Fourier Series Coefficients

$$x(t) = A[0] + \sum_{k=1}^{\infty} A[k]\cos\left(\frac{k2\pi}{T}t\right) + \sum_{k=1}^{\infty} B[k]\sin\left(\frac{k2\pi}{T}t\right)$$

$$= \boxed{\frac{1}{4} + \sum_{k=1}^{\infty} \frac{1}{2}\cos\left(\frac{k2\pi}{8}\right)\cos\left(\frac{k2\pi}{8}t\right) + \phi}$$

equal

Summary

Let $x(t)$ be a periodic signal $x(t) = x(t+T)$

Fourier Series Representation of $x(t)$ is;

$$\boxed{x(t) = \sum_{k=-\infty}^{\infty} x[k] e^{jk\frac{2\pi}{T}t}} \quad \text{and} \quad \boxed{x[k] = c_1 c_2 \int_T x(t) e^{-jk\frac{2\pi}{T}t}\, dt}$$

$$\left.\begin{array}{ll} c_1 = \frac{1}{\sqrt{T}}, & c_2 = \frac{1}{\sqrt{T}} \\ c_1 = 1, & c_2 = \frac{1}{T} \\ c_1 = \frac{1}{T}, & c_2 = 1 \end{array}\right\} c_1 c_2 = \frac{1}{T}$$

Property

$x(t) \longrightarrow$ periodic $\quad x(t) = x(t+T)$

if $y(t) = \frac{dx(t)}{dt}$ then $y(t)$ has to be periodic.