FOURIER SERIES – PROBLEM SESSION

How Do We Find the Fourier Coefficients

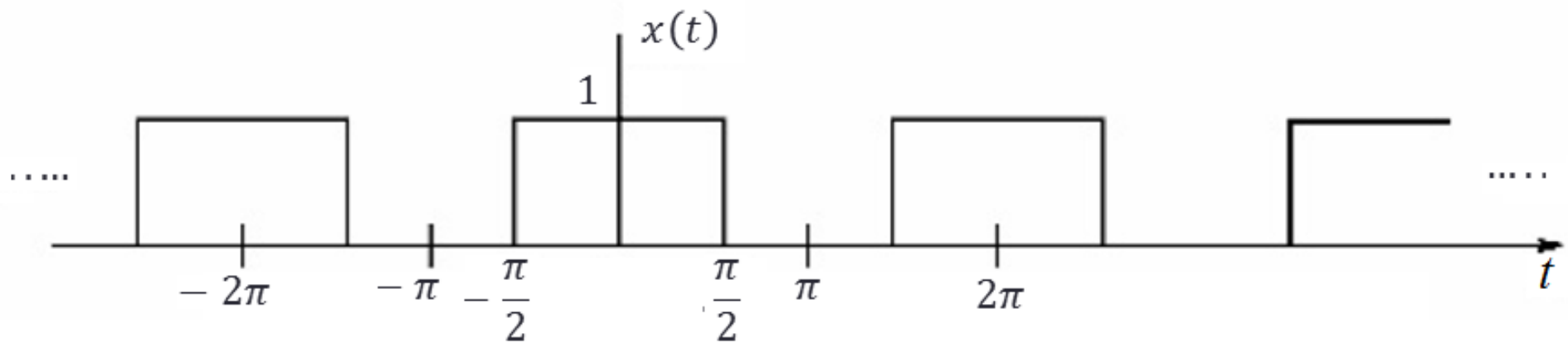
CT Fourier Series Pair $\left(\omega_0 = \frac{2\pi}{T}\right)$

$$x(t) = \sum_{k=-\infty}^{\infty} a_k e^{jk\omega_0 t} \qquad \text{(Synthesis equation)}$$

$$a_k = \frac{1}{T}\int_T x(t) e^{-jk\omega_0 t} dt \qquad \text{(Analysis equation)}$$

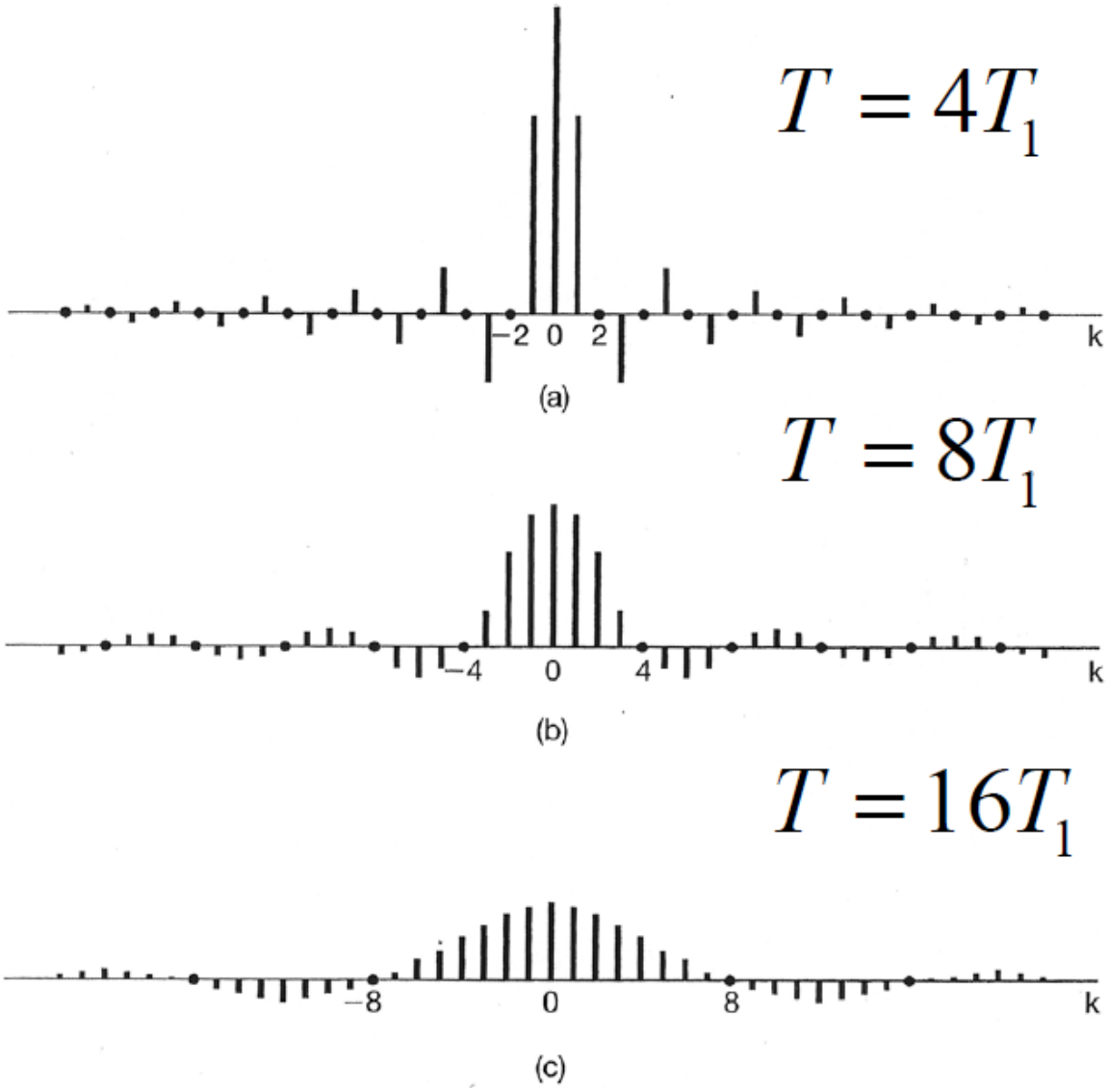
Problem-1

- Find the Fourier series coefficients of the signal below. Also, plot the first few coefficients.



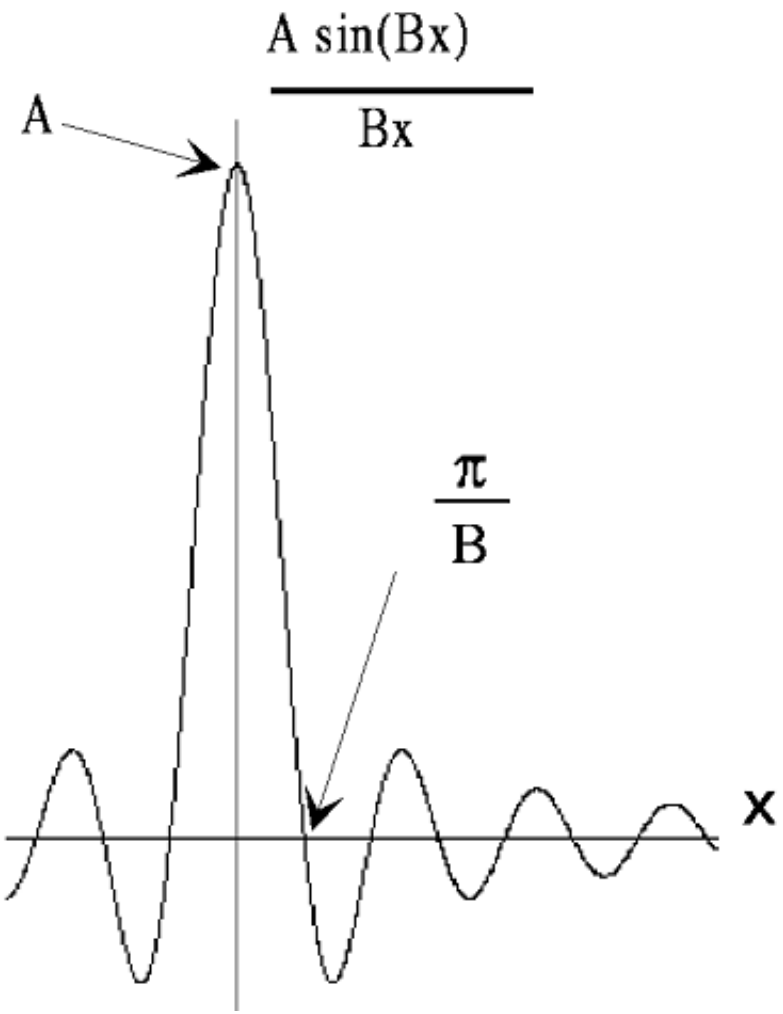
Fourier Series of Periodic Square Wave

Magnitude of exponentials



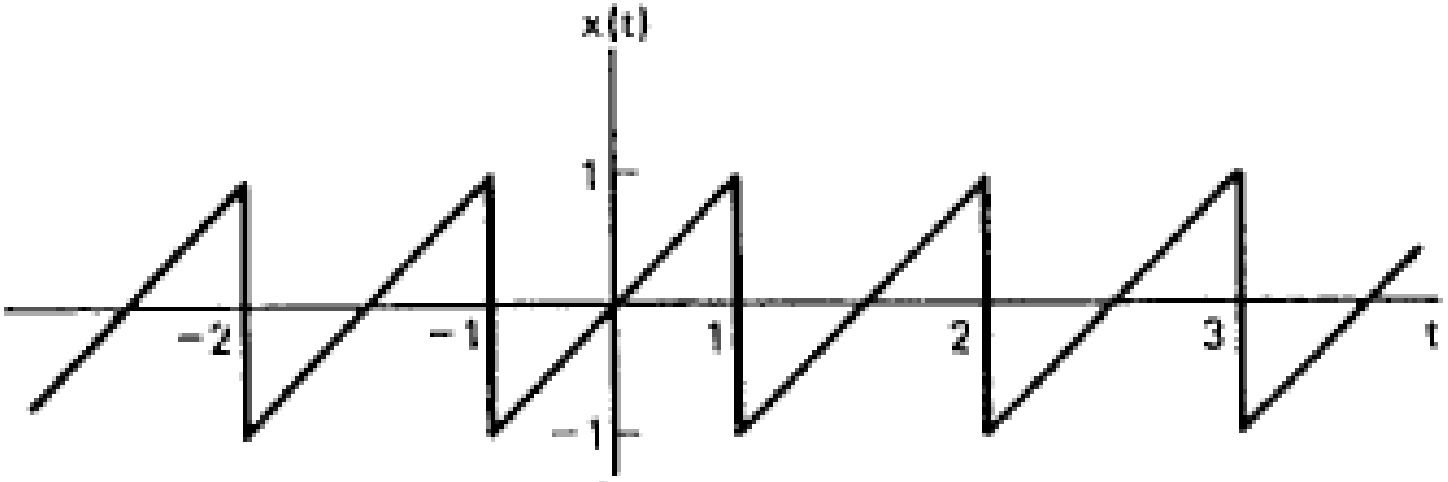
Fourier Series of Periodic Square Wave

- The Fourier series of a square wave is a sinc function as shown below:



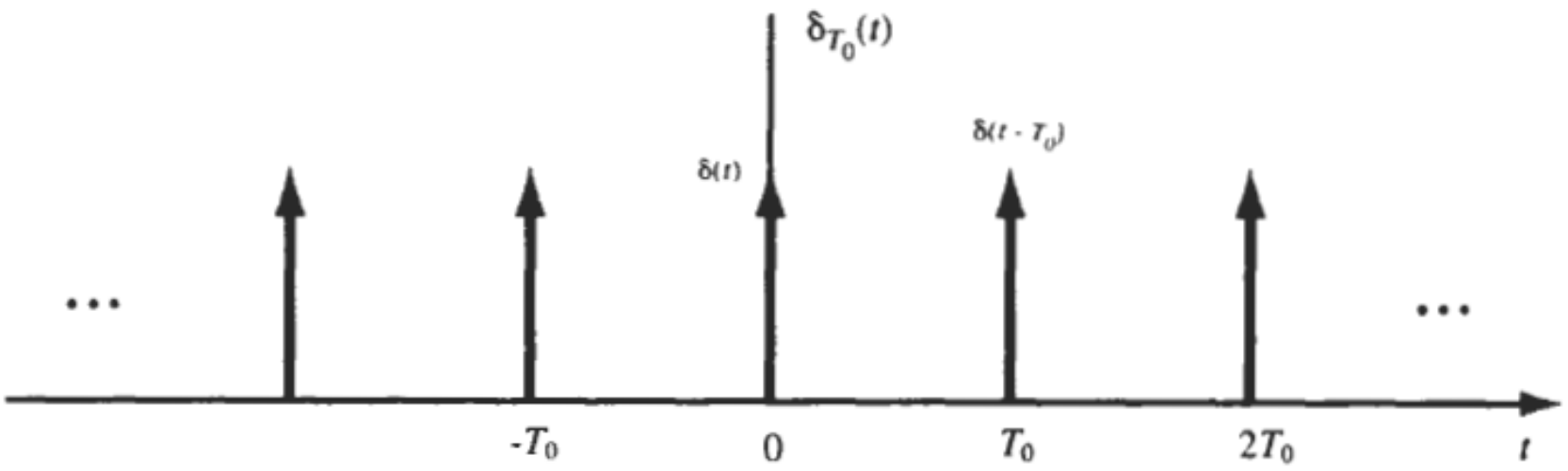
Problem-2

- Find the Fourier series coefficients of the signal below. Also, plot the first few coefficients.



Problem-3

$$\delta_{T_0}(t) = \sum_{k=-\infty}^{\infty} \delta(t - kT_0)$$



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