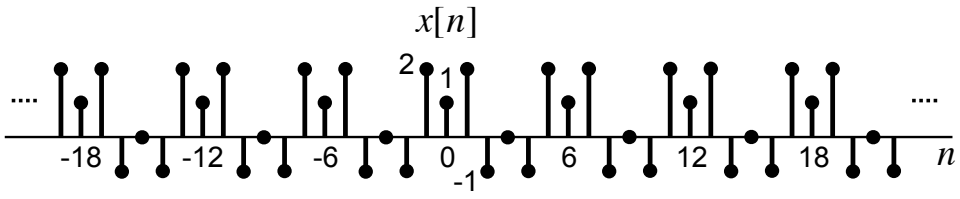
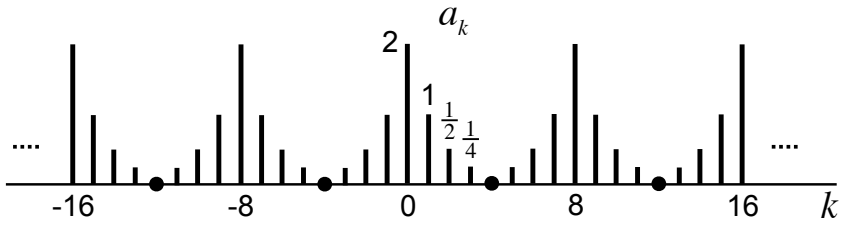
EE3210 Signals and Systems

Tutorial 9

Problem 1: Determine the Fourier series coefficients of a discrete-time periodic signal $x[n]$ shown in the following figure.



Problem 2: The following figure specifies the Fourier series coefficients a_k of a discrete-time signal $x[n]$ that is periodic with fundamental period 8. Determine the signal $x[n]$.



Problem 3: Consider the following three discrete-time signals:

$$x[n] = 1 + \cos\left(\frac{2\pi}{6}n\right), \quad y[n] = \sin\left(\frac{2\pi}{6}n + \frac{\pi}{4}\right), \quad z[n] = x[n]y[n].$$

(a) Determine the Fourier series coefficients of $x[n]$.

(b) Determine the Fourier series coefficients of $y[n]$.

(c) Use the results of parts (a) and (b), along with the multiplication property of the discrete-time Fourier series, to determine the Fourier series coefficients of $z[n]$.

(d) Determine the Fourier series coefficients of $z[n]$ through direct evaluation, and compare your result with that of part (c).