

Problem 11.1: Determine the Fourier series of the following signals. Use a straightedge to plot the magnitude and phase of the Fourier series coefficients. Label all axes and all important features. Show the origin for context.

(a) $x_a(t) = \cos(100t)$

(b) $x_b(t) = \sin(100t)$

(c) $x_c(t) = \sin(100t + \pi)$

(d) $x_d(t) = \cos(1000t)$. Comment on your answer as compared to part (a).

Problem 11.2: Determine the Fourier series of the following signals. Use a straightedge to plot the magnitude and phase of the Fourier series coefficients. Label all axes and all important features. Show the origin for context.

(a) $y_a(t) = 2 \cos(100t) - \sin(200t)$

(b) $y_b(t) = 1 + \cos\left(75t + \frac{\pi}{3}\right) + 3 \sin(100t)$

Problem 11.3: Determine the Fourier series for the periodic signal $g(t)$ shown in Figure 1. Use a straightedge to plot the Fourier series coefficients—you will need to determine how many plots are required to represent the series. Label all axes and all important features. Show the origin for context.

Problem 11.4: A periodic continuous-time signal $w(t)$ with fundamental period $T = 6$ has non-zero Fourier series coefficients

$$a_0 = \frac{1}{2}, \quad a_2 = a_{-2} = 3, \quad a_5 = a_{-5}^* = j2$$

Determine a mathematical expression for $w(t)$ and plot the signal. Use a straightedge and label both axes and all important features. Show the origin for context.

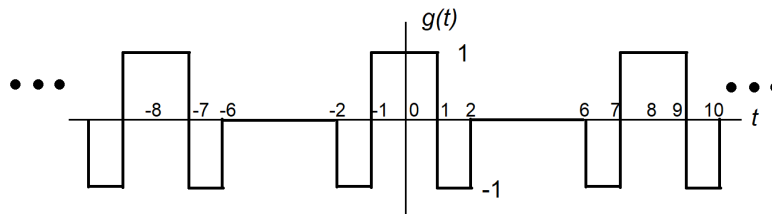


Figure 1

Optional, but testable, problems: From the textbook, Problems 3.1, 3.4, 3.22