CPE 3500 Homework-4

1. A continuous-time periodic signal x(t) is real-valued and has a fundamental period T = 8. The nonzero Fourier series coefficients for x(t) are

$$a_1 = a_{-1} = 2, \quad a_3 = a_{-3}^* = 4j$$

Determine x(t).

2. A discrete-time periodic signal x[n] is real-valued and has a fundamental period N = 5. The nonzero Fourier series coefficients for x[n] are

$$a_0 = 1\,, \qquad a_2 = a_{-2}^* = e^{j\pi/4}, \qquad a_4 = a_{-4}^* = 2e^{j\pi/3}$$

Determine x[n].

3. For the continuous-time periodic signal

$$x(t) = 2 + \cos\left(\frac{2\pi}{3}t\right) + 4\sin\left(\frac{5\pi}{3}t\right),$$

Determine the fundamental frequency ω_0 and the Fourier Series coefficients a_k.

4. Use the Fourier transform analysis equation to calculate the Fourier transforms of:

a) $e^{-2(t-1)}u(t-1)$
b) $e^{-2|t-1|}$

Plot the magnitude of each transform.