1. For the periodic signal
\[ x(t) = (t + 1)^2 \text{ for } -1 < t < 1 \text{ extended periodically with period } T_0 = 2 \]
(a) Determine its Fourier Series using the trig form
(b) Determine its Fourier Series using the compact trig form and your result from part a
(c) Plot the spectrum using your results from part b
(d) Plot the original signal and the Fourier series approximation over one period for the first three non-zero terms.

2. For the periodic signals below,
\[ x(t) = t e^{\left| t \right|} \text{ for } -1 < t < 1 \text{ extended periodically with period } T_0 = 2 \]
(a) Determine their Fourier Series using the exponential form
(b) Plot the spectrum using your results from part a
(c) Plot the original signal and the Fourier series approximation over one period for the first three non-zero terms.

3. Obtain the exponential form of the Fourier series expansions for each of the signals below (if it exists) without using integration, but applying trigonometric identities and Euler’s formula. Be sure to state what the fundamental period is.
(a) \( \cos \left( \frac{3\pi}{2} t \right) \)
(b) \( \sin(2t) \)
(c) \( \cos(5\pi t) + \sin(7\pi t + \pi/9) \)
(d) \( \sin(10\pi t) + 2\cos(10t) \)
4. Given the periodic signal below

(a) Determine the Fourier series spectrum for the signal.

(b) If the signal is applied to the input of the following circuit where \( R_1 = R_2 = 10k\Omega \), and \( C_1 = C_2 = 1\mu F \), what would be the output response be?

(c) Plot the input from part a and the response from part b in the time domain on the same plot using \( N = 10 \) terms of the Fourier series.