1. A periodic waveform is formed by erasing every other cycle of a sinusoidal signal. More specifically, define \( f(t) \) as
\[
f(t) = \begin{cases} 
\sin(t) & 4k\pi \leq t \leq (4k + 2)\pi \\
0 & \text{otherwise.}
\end{cases}
\]
where \( k \) is any integer.

(a) Plot the signal \( f(t) \) for several periods.
(b) What is the fundamental period of this waveform?
(c) Find the Fourier Series coefficients of \( f(t) \).
(d) If \( f(t) \) is shifted to the left by \( \pi \), the resulting signal is an odd function. Find the Fourier series coefficients of the shifted function. Now using these coefficients compute the Fourier series coefficients of \( f(t) \).

2. Evaluate the following integrals:

(a) \( \int_{-\infty}^{\infty} \delta(t - 2) \sin(t) \, dt \).
(b) \( \int_{-\infty}^{\infty} \delta(t + 2)e^{-t} \, dt \).
(c) \( \int_{-\infty}^{\infty} \delta(1 - t)(t^3 + 4) \, dt \).

3. Find the Fourier transform of the functions plotted below.
   You can use tables and properties of Fourier transform to find the answer.
4. The following functions of time are given. Plot each function and find its Fourier transform.

(a) 
\[ x(t) = \begin{cases} \cos(20t) & -\frac{\pi}{5} \leq t \leq \frac{\pi}{5} \\ 0 & \text{otherwise.} \end{cases} \]

(b) 
\[ y(t) = \begin{cases} -\frac{40}{9n}t \cos(20t) & -\frac{9\pi}{40} \leq t \leq \frac{9\pi}{40} \\ 0 & \text{otherwise.} \end{cases} \]

5. The signal \( x(t) \) has Fourier transform \( X(f) \). Find the Fourier transform of the following signals in terms of \( X(f) \).

(a) \( x(t - 1) \).
(b) \( x(1 - t) \).
(c) \( tx(t - 2) \).
(d) \( t \frac{dx(t)}{dt} \).