Problem 1.
Evaluate each of the following functions and see if it is periodic. If periodic, find its period.

(a) \( f(t) = \cos \pi t + 2 \cos 3 \pi t + 3 \cos 5 \pi t \)
(b) \( y(t) = \sin t + 4 \cos 2 \pi t \)
(c) \( g(t) = \sin 3t \cos 4t \)
(d) \( h(t) = \cos^2 t \)
(e) \( z(t) = 4.2 \sin (0.4 \pi t + 10^\circ) + 0.8 \sin (0.6 \pi t + 50^\circ) \)
(f) \( p(t) = 10 \)
(g) \( q(t) = e^{-\pi t} \)

Problem 2.
Obtain the Fourier series expansion for the waveform shown below.

Problem 3.
Find the trigonometric Fourier series for
\[ f(t) = 20 \text{ for } 0 < t < \pi \text{ and } is = 40 \text{ for } \pi < t < 2\pi. \]
In addition the function is periodic, in other words, \( f(t) = f(t+2\pi) \).

Problem 4.
Find the quadrature (cosine and sine) form of the Fourier series
\[
 f(t) = 2 + \sum_{n=1}^{\infty} \frac{10}{n^3 + 1} \cos \left( 2nt + \frac{n\pi}{4} \right)
\]

Problem 5.
Express the Fourier series
\[
 f(t) = 10 + \sum_{n=1}^{\infty} \frac{4}{n^2 + 1} \cos 10nt + \frac{1}{n^3} \sin 10nt
\]
(a) in a cosine and angle form,
(b) in a sine and angle form.

Problem 6.
Determine if these functions are even, odd, or neither.

(a) \(1 + t\)
(b) \(t^2 - 1\)
(c) \(\cos n\pi t \sin n\pi t\)
(d) \(\sin^2 \pi t\)
(e) \(e^t\)

**Problem 7.**
Determine the fundamental frequency and specify the type of symmetry present in the functions shown below.