**PROBLEM:**

The Fourier transform of a signal \( x(t) \) is shown in the following figure.

\( X(j\omega) \)

\(- j2\pi \)

\(-5\pi \)

\(-1.5\pi \)

0

1.5\pi

5\pi

\( 4\pi(1-j) \)

\( 4\pi(1+j) \)

\( 2\pi \)

\( j2\pi \)

(a) Write an equation for \( x(t) \) in terms of \textit{cosine} functions.

(b) Suppose that \( x(t) \) is modulated by a cosine of frequency \( \omega_c = 2.5\pi \), and then lowpass filtered with a filter that has a frequency response

\[
H(j\omega) = \begin{cases} 
1 & |\omega| \leq 2\pi \\
0 & \text{otherwise} 
\end{cases}
\]

\[
x(t) \quad \xrightarrow{\text{modulation}} \quad w(t) \quad \xrightarrow{\text{LTI System}} \quad y(t)
\]

\[
\text{LTI System} \quad H(j\omega)
\]

\[
\cos(2.5\pi t)
\]

Make a plot of the Fourier transform of \( y(t) \).