Name: ______________________
Campus ID: ______________________
Total Marks: 10
Time Duration: 15 minutes

Information:

• Time-shift property: \( x(t - t_0) \overset{\mathcal{F}}{\longleftrightarrow} e^{-j \omega t_0} X(j \omega) \)

• Synthesis Equation:

\[
    x(t) = \frac{1}{2\pi} \int_{-\infty}^{\infty} X(j \omega) e^{j \omega t} d\omega
\]

Question 1  (4 marks)

Determine and plot the Fourier transform of the following signal

\[
x(t) = \begin{cases} 
1 & |t| < T, \\
0 & |t| > T.
\end{cases}
\]

Question 2  (2 marks)

Plot (with labels) the following signal

\[
y(t) = u(t + 1) - u(t - 4).
\]

Question 3  (2 marks)

Determine the Fourier transform of \( y(t) \).

Question 4  (2 marks)

Determine and plot the inverse Fourier transform of

\[
z(\omega) = 3\cos(2\omega) - 4j.
\]