ECE250: Signals & Systems
Assignment 3: Report

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Assumptions:

1. The signal $\delta[n]$ is the discrete-time unit-impulse signal, defined below:

$$\delta[n] = \begin{cases} 1 & \text{if } n = 0 \\ 0 & \text{if } n \neq 0 \end{cases} \tag{1}$$

2. Since we cannot deal with *continuous*-time signals in Python, I have used 1000 samples between $[-2\pi, 2\pi]$ to plot the continuous functions obtained in the frequency domain as a result of the DTFT.
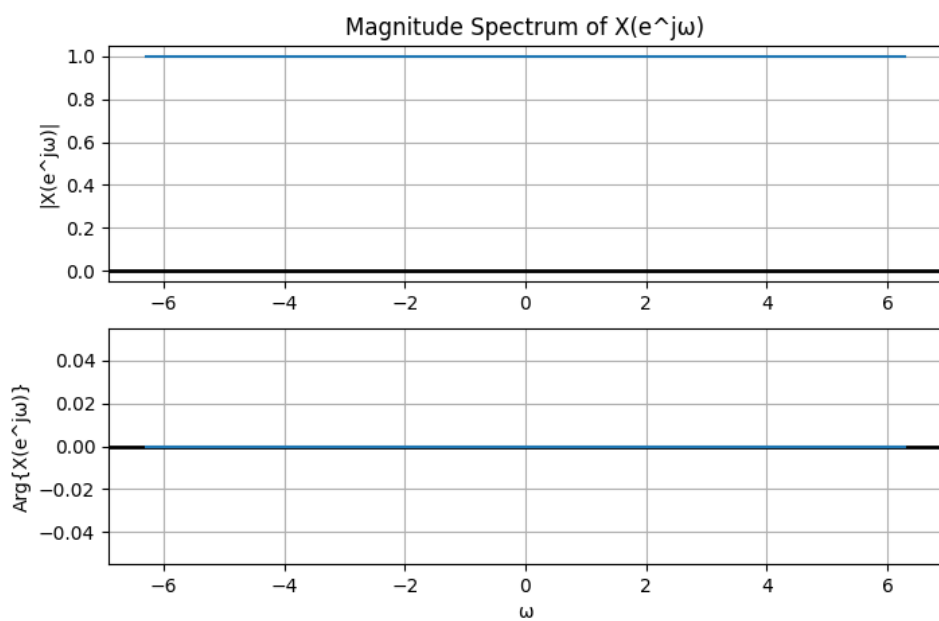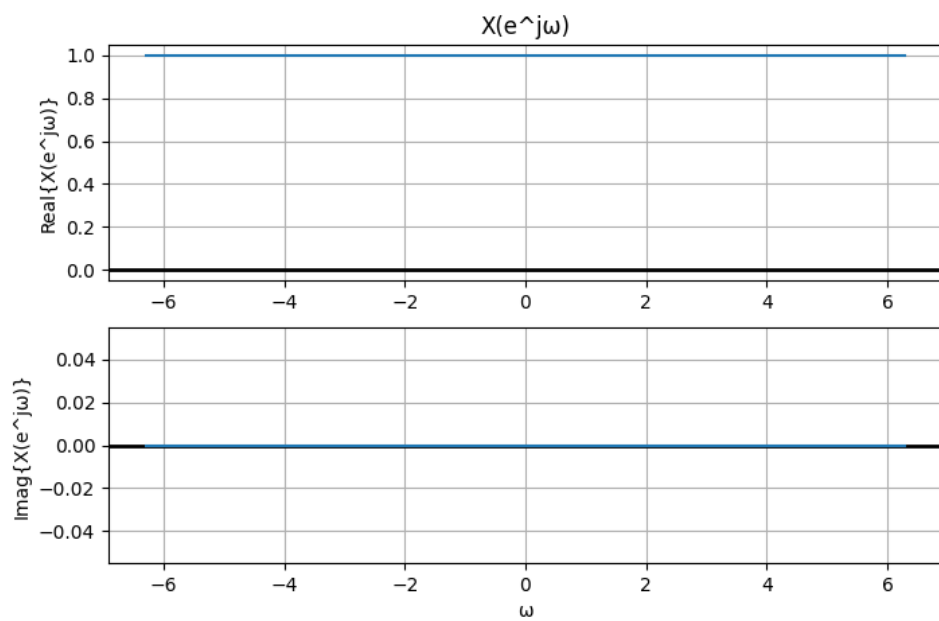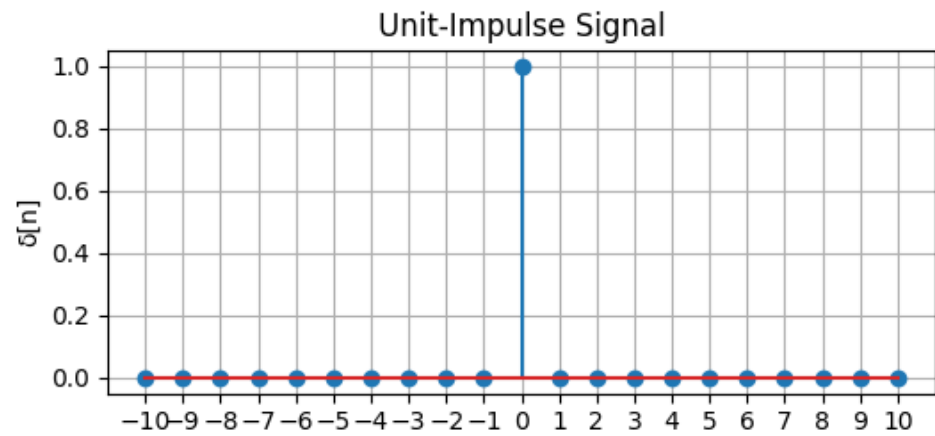
Notes:

1. **Question: 1** asks us to plot the signals $x_1[n]$ and $x_2[n]$ for $n \in [-1000, 1000]$. However, I have plotted the signals for $n \in [-10, 11]$ for better visualization.
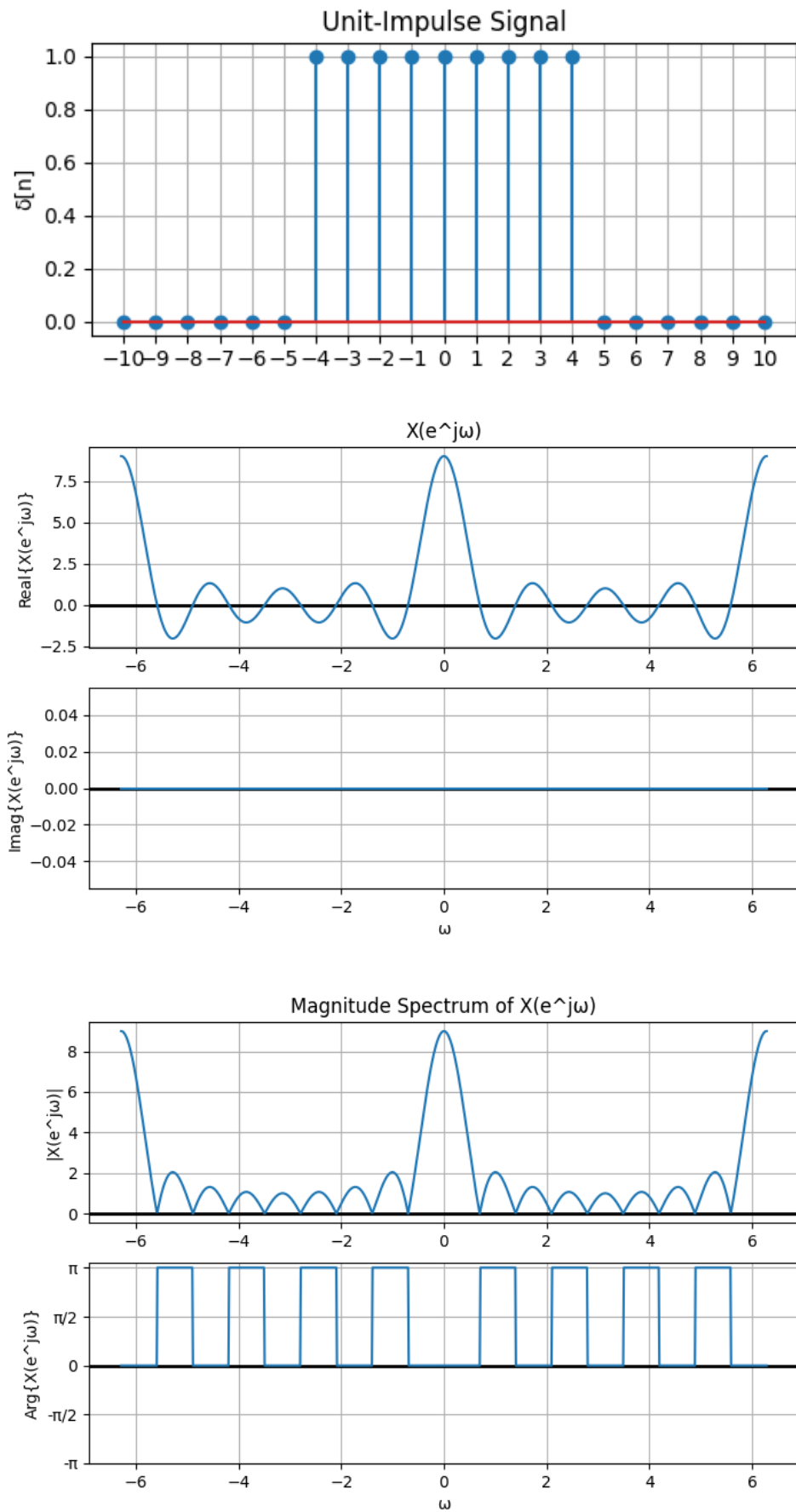
Question: 1

(a) $x_1[n] = \delta[n]$ as defined above

(b)

$$x_2[n] = \begin{cases} 1 & \text{if } n \in [-4, 4] \\ 0 & \text{otherwise} \end{cases} \tag{2}$$

Unit-Impulse Signal

X(e^jω)

Magnitude Spectrum of X(e^jω)

Subplots for **Question: 1 (a)**

Unit-Impulse Signal

X(e^jω)

Magnitude Spectrum of X(e^jω)

Subplots for **Question: 1 (b)**