ECE250: Signals and Systems

Assignment 4

Issued on: November 3, 2023 | **Max Marks: 10** | Due by: November 14 ,2023 (1:30 pm)

Guidelines for submission

- Use Matlab or python to solve the programming problems.
- For your solutions, you need to submit a zipped file on Google classroom with the following:
  - program files (.m) or (.ipynb) with all dependencies.
  - a report (.pdf) with your coding outputs and generated plots. The report should be self-complete with all your assumptions and inferences clearly specified.
- Before submission, please name your zipped file as: "A4 RollNo Name.zip". • Codes/reports submitted without a zipped file or without following the naming convention will NOT be checked.
- **Important Note**: Do not use inbuilt functions in MATLAB or PYTHON. Use mathematical equations/derivations to solve the required.

Institute Plagiarism Policy: This will be subjected to a strict plagiarism check.

Programming Problems (10 points)

[CO4] **Q1.** Let $X(j\omega)$ be the Fourier transform of the signal $x(t)$ given in Fig.2.

(a) Determine and Plot the frequency domain signal $X(j\omega)$. **[1 Point]**

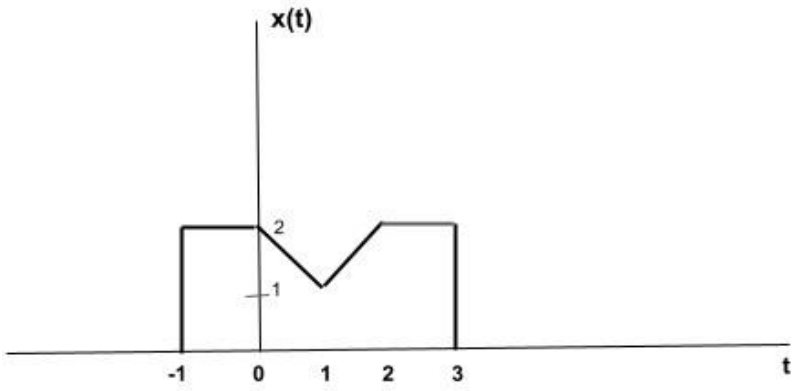

Figure 2: Q1

(b) Plot the magnitude spectrum of the frequency domain signal $X(j\omega)$. **[1 Point]**

(c) Plot the phase spectrum of the frequency domain signal $X(j\omega)$. **[1 Point]**

(d) Plot the inverse Fourier transform of real part of $\{X(j\omega)\}$. **[1 Point]**

ECE250: Signals and Systems

Assignment 4

Issued on: November 3, 2023

Max Marks: 10

Due by: November 14 ,2023 (1:30 pm)

[CO4] **Q2.** Let $x[n]$ be a discrete-time signal with Fourier Transform $X(e^{j\omega})$, which is the given Fig.3. Plot the frequency response, magnitude spectrum and phase spectrum of $w[n] = x[n]p[n]$, for these $p[n]$

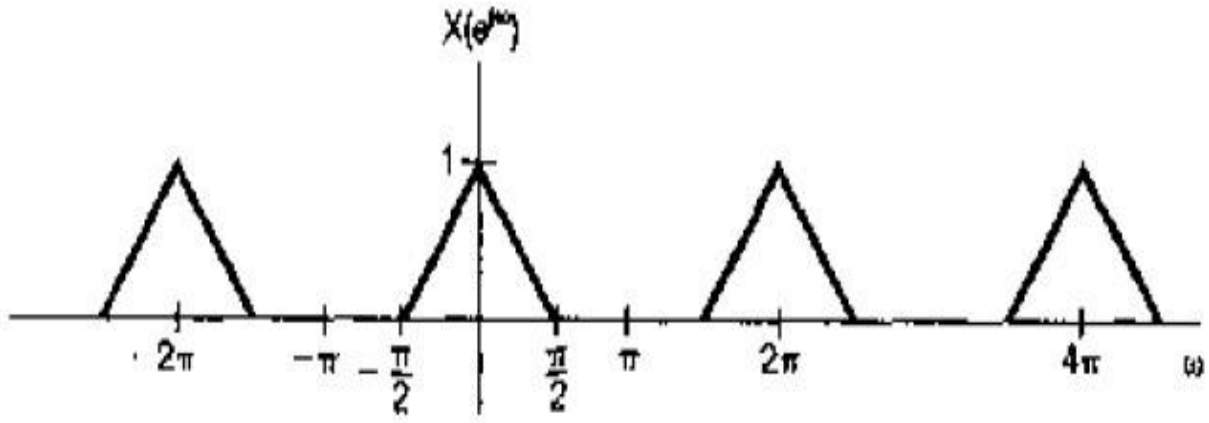

Figure 3: Q2

(a) $p[n] = \cos(\pi n)$ **[2 Points]**

(b) $p[n] = \sin(\pi n/2)$ **[2 Points]**

(c) $p[n] = \sum_{k=-\infty}^{\infty} \delta(n - 2k)$ **[2 Points]**