BLG354E –Midterm Exam (Coding Part)
08.05.2023

For the periodic signals $x_1[n]$ and $x_2[n]$ one of their periods are defined as below.

$$x_1[n] = 0.5^n u[n], \quad 0 \leq n \leq 14, T = 15 \,,$$

$$x_2[n] = \delta[n] + 2\delta[n-1] + 4\delta[n-3] + 5\delta[n-4] - 10\delta[n-5], \quad 0 \leq n \leq 5, T = 6$$

Write a Python code which

- Generates and plots the signals for some periods.
- Calculates Discrete Time Fourier Series coefficients a_k for the given signals.
- Obtains complex magnitudes for each coefficient (For $a + bj$ it is $\sqrt{a^2 + b^2}$)
- Prints the maximum magnitude.

An example for $x_2[n]$ is given below:

The a_k coefficients for this signal could be find as:

```
0.33333333+0.00000000e+00j
-1.58333333-1.01036297e+00j
1.08333333-2.45373864e+00j
1.66666667+4.10359841e-15j
1.08333333+2.45373864e+00j
-1.58333333+1.01036297e+00j
```

The magnitudes could be found as:

```
0.33333333
1.87823794
2.68224616
1.66666667
2.68224616
1.87823794
```

The maximum magnitude is printed as (Use one decimal without rounding):

```
2.6
```