ITU
Computer Engineering Department
Assoc. Prof. Hazım Kemal EKENEL

Due:
17.04.2017
23:30

BLG 354E – HOMEWORK 3

1-)(20 pts) Find the discrete-time Fourier series for $x[n] = \sin(0.1\,\pi n)$. (**Hint:** After using Analysis formula, you will see that the signal has only two non-zero Fourier series coefficients, the remaining can be eliminated.)

2-) (20 pts) A continuous-time signal $x(n)$ is defined as

$$x(n) = \begin{cases} t+1, & -1 \le t \le 1 \\ 0, & 1 < t < 2 \end{cases}$$

in one of its periods.

a) Draw the signal.
b) Find out the continuous-time Fourier series coefficients.

3-) (20 pts) A periodic sequence is defined as

$$h[k] = \begin{cases} 1, & |k| \le N \\ 0, & N+1 \le k \le K-N-1 \end{cases}$$

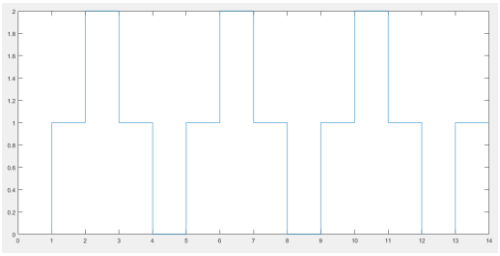
where the fundamental period is K and $K > (2N+1)$.

a) Find the general equation of the sequence's discrete-time Fourier series coefficients.
b) Let K=10 and N = 1. Find the DTFS coefficients and plot their values for two periods.

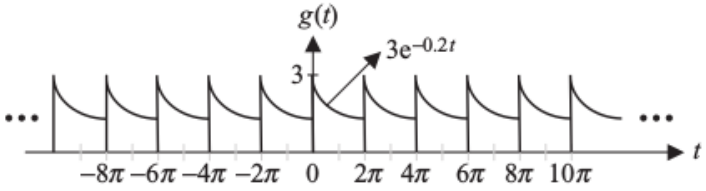
4-) (20 pts) Determine the DTFS coefficients of the periodic discrete-time sequence x[k] with one fundamental period defined as

$$x[k] = 0.5^k u[k] \qquad 0 \le k \le 14$$

5-) (20 pts) Determine the DTFS coefficients of the following signal.



BONUS) (15 pts) Consider the periodic signal g(t) given in the figure below. Calculate the continuous-time Fourier coefficients.



Notes:

- Please write your answers briefly and add explanations at necessary points to make your calculations more understandable.
- You can solve the mathematical questions by hand, scan them and place to your report.
- If you have any questions, feel free to contact Res. Asst. Yusuf Hüseyin Şahin (sahinyu@itu.edu.tr).