

# **Marmara University, Computer Engineering Department**

## **Introduction to Signals and Systems**

### **Online Final Exam**

**01.07.2020**

### **Solution and Submission Rules**

- Textbook, slides and notes are open.
- Internet usage is not allowed; however, computers and cell phones may be used only viewing course materials provided for this course.
- This online exam consists of 4 questions.
- Please write your answers clearly and neatly.
- Show all your work.
- Please draw a box around your final results.

### **Exam Checklist**

- ☐ I have written my name, surname and student ID on the top of each exam solution page.
- ☐ I have written the following sentence on the top of the first page with my handwriting and signed it:  
*“On my honor, I have neither given nor received any unauthorized assistance on this examination.”*
- ☐ I have solved all the questions with my handwriting on blank A4 pages.
- ☐ I have scanned all the solution pages to a single PDF file named “myname\_surname.pdf”.
- ☐ I have uploaded the PDF file via UES system before the deadline.

1) Consider a discrete LTI system. When the input is  $\underline{-1}, 3, 2, 4$ , the output is  $\underline{0}, -2, 7, 1, 6, -4, 0, 0$ . If the input is  $4, \underline{0}, -2, -7, 1, 0, 2$  what will be the output?

2) Convolve  $tU(t)$  with  $-tU(t)$ . Evaluate the integrals and plot the result.

3) Compute the Fourier transform of  $1 + e^{-3|t|}(2U(t) - 1)$ .

4) Consider the signal  $f(t)$  whose Fourier transform is

$$F(\omega) = (\omega + 100\pi)\chi_{[-100\pi, 0]}(\omega) + (100\pi - \omega)\chi_{[0, 100\pi]}(\omega)$$

Draw the signal  $f(t)\cos(300\pi t)$  in frequency domain.