

Exercise 1

Class: Principle of Communication Systems

Semester: 4002

Deadline: **23:59 _ friday _ 27/12/1400**

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چند نکته

پاسخ تمارین را در همین فایل تکمیل کنید و در صورت نیاز نسبت به ارائه راه حل خود توضیح دهید -
دقت شود که کد های ارسالی دارای کامنت های توضیح خط به خط باشد و شکل ها نیز دارای لیبل و عنوان باشد
فایل نهایی بصورت فایل زیپ با اسم گفته شده در ابتدای ترم ارسال شود
به کد های مشابه نمره ای تعلق نمیگیرد

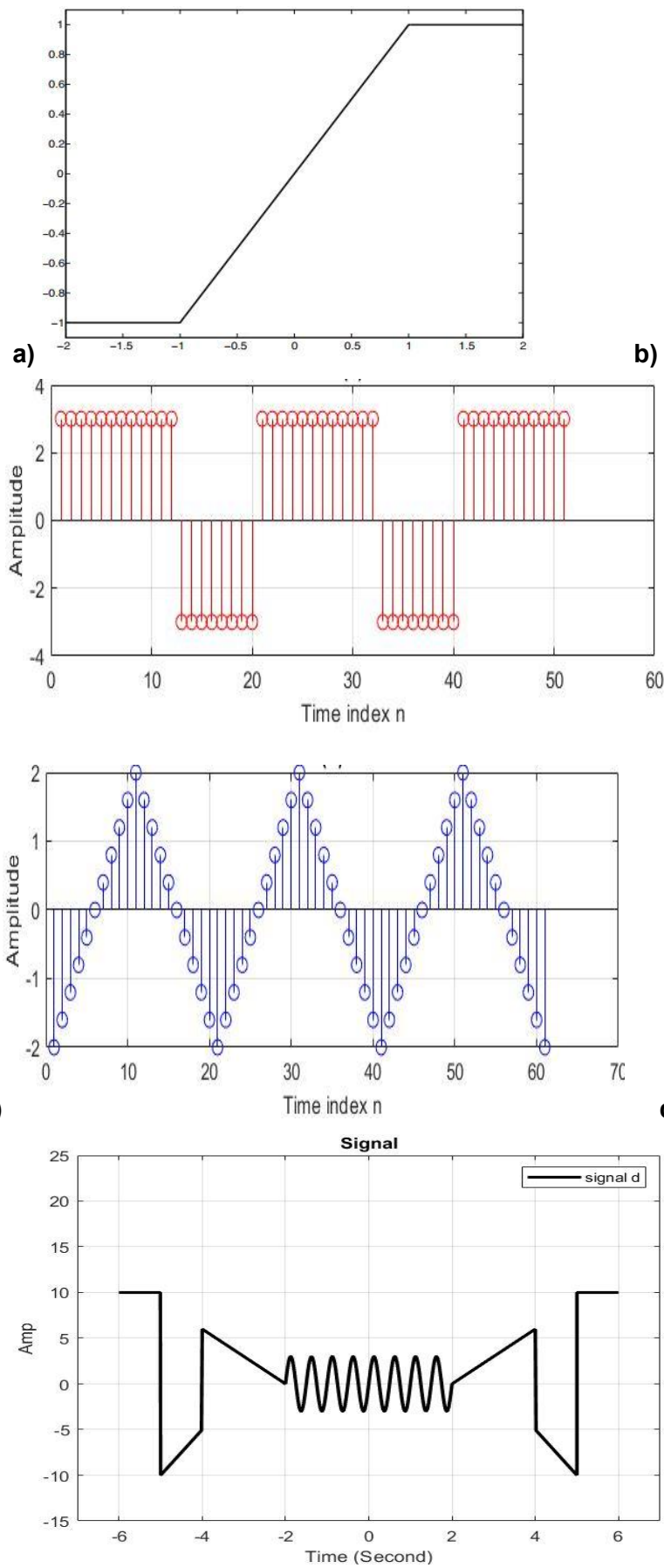
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Question 1:

Plot Below signal

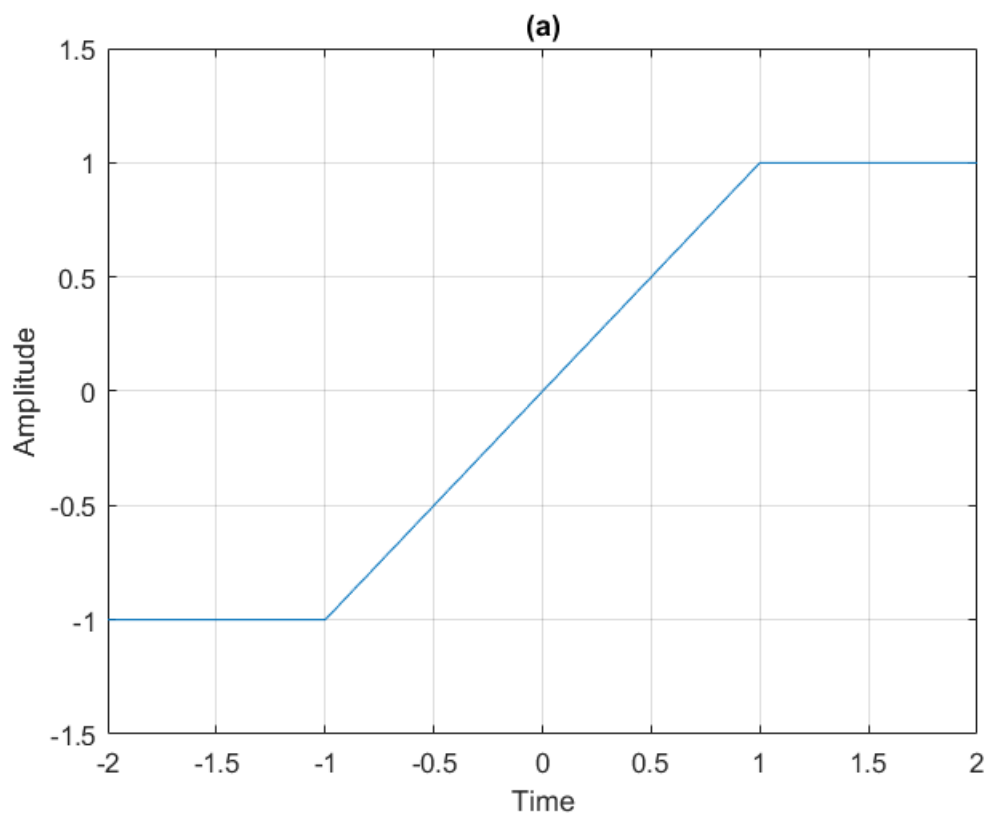
- plot signal a just with Min Max Function
- plot signal b with square Function
- plot signal b with sawtooth Function



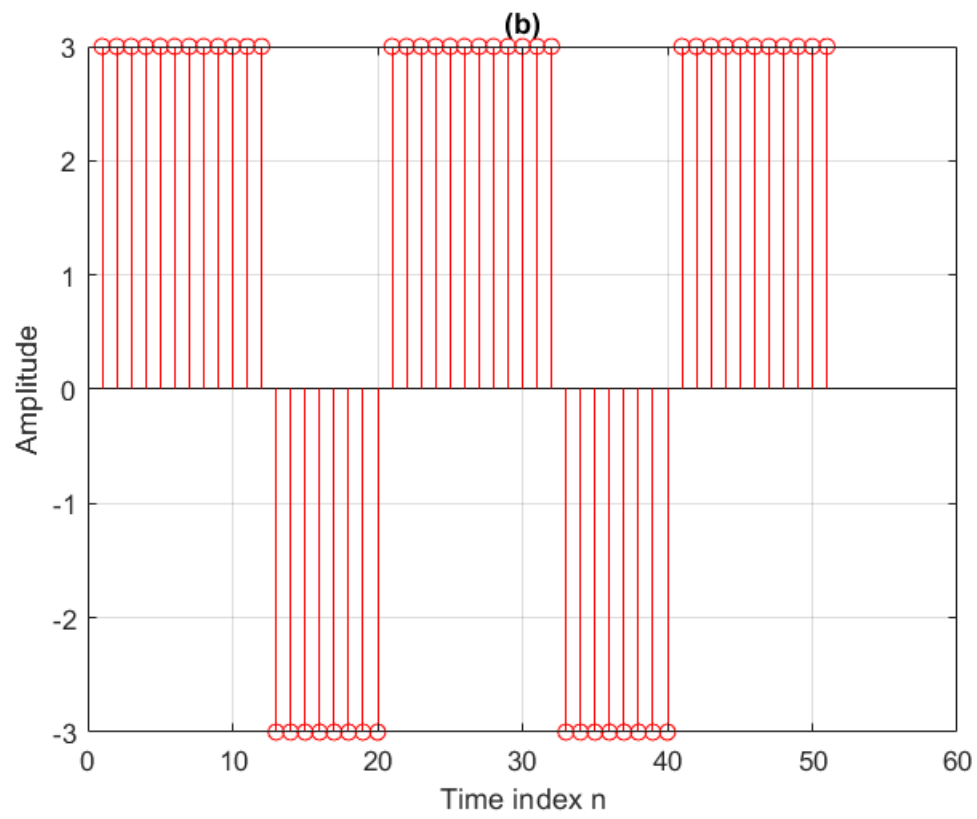
clc

clear all

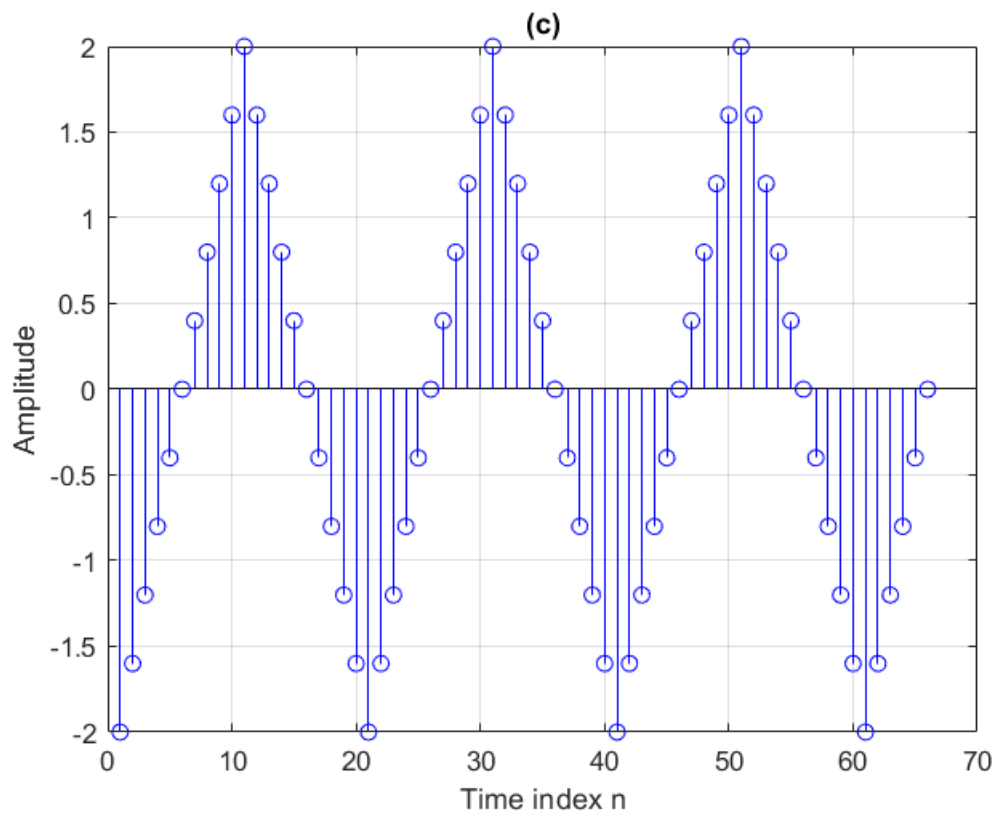
Signal a)



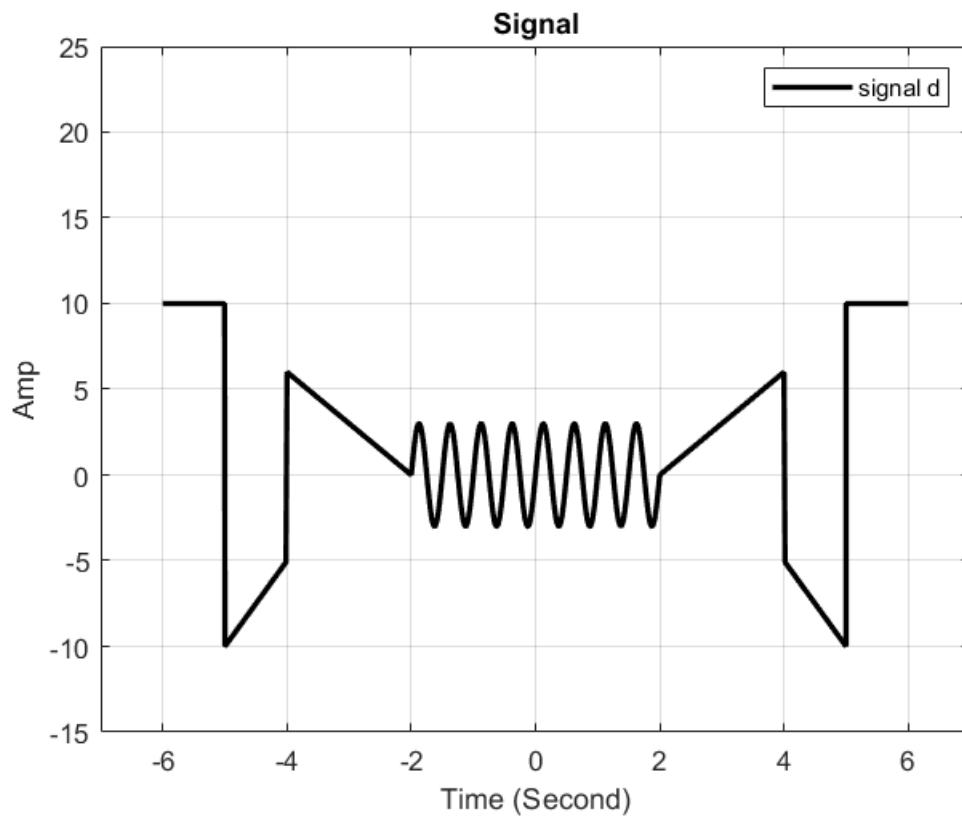
Signal b)



Signal c)



Signal d)



Question 2:

a) Calculate Integral of Signal d of Q1

b) solve this equation with matlab and plot each one with surf

$$\begin{cases} x + y + z = 3 \\ x^2 + y^2 + z^2 = 5 \\ e^x + xy - xz = 1 \end{cases}$$

c) solve these differential equation with their initial conditions and then plot the answer

(first one is optional)

$$\begin{cases} 3y^2 y' = 4 \sin(x) \rightarrow y(0) = 2 \\ y''' - xy' + (1-x)y = \sin(y) \rightarrow y(0) = 1 \end{cases}$$

```
clc
clear all
```

a)

ans = 17.0001

b)

c)

Question 3:

a) Create a 2d array with 1 on the border and 0 inside , Expected output :

```
1 1 1 1 1 1 1 1 1 1
1 0 0 0 0 0 0 0 0 1
1 0 0 0 0 0 0 0 0 1
1 0 0 0 0 0 0 0 0 1
1 0 0 0 0 0 0 0 0 1
1 0 0 0 0 0 0 0 0 1
1 0 0 0 0 0 0 0 0 1
1 0 0 0 0 0 0 0 0 1
1 0 0 0 0 0 0 0 0 1
1 1 1 1 1 1 1 1 1 1
```

b) Consider the vector [1, 2, 3, 4, 5, 6, 7, 8, 9] and n: (number of zeros), how to build a new vector with 3 consecutive zeros interleaved between each value ?

Input : n = 3 [1, 2, 3, 4, 5, 6, 7, 8, 9]

Expected output : [1. 0. 0. 0. 2. 0. 0. 0. 3. 0. 0. 0. 4. 0. 0. 0. 5. ...]

```
clc
clear all
```

a)

```
arr = 10x10
1 1 1 1 1 1 1 1 1 1
1 0 0 0 0 0 0 0 0 1
1 0 0 0 0 0 0 0 0 1
1 0 0 0 0 0 0 0 0 1
1 0 0 0 0 0 0 0 0 1
1 0 0 0 0 0 0 0 0 1
1 0 0 0 0 0 0 0 0 1
1 0 0 0 0 0 0 0 0 1
1 0 0 0 0 0 0 0 0 1
1 1 1 1 1 1 1 1 1 1
```

b)

Question 4:

write function `multiply_matrices` that compute multiplication of 2 matrices with dimensional (n,m) and (m,n) and validate it with some example.

```
clc  
clear all
```